Directive 065: Resources Applications for Oil and Gas Reservoirs

April 5, 2016

Application Requirements for Activities Within the Boundary of a Regional Plan

The AER is legally obligated to act in compliance with any approved regional plans under the *Alberta Land Stewardship Act*. To ensure this compliance, the AER is requiring any applicant seeking approval for an activity that would be located within the boundary of an approved regional plan to meet the requirements below. These requirements will be formally incorporated into the directive at a later date.

A) For an activity to be located within the boundary of an approved regional plan, the applicant must assess
   I) whether the activity would also be located within the boundaries of a designated conservation area, a provincial park, a provincial recreation area, or public land area for recreation and tourism and, if so, whether the mineral rights associated with the activity are subject to cancellation;
   II) whether the activity is consistent with the land uses established in the applicable regional plan or with any of the outcomes, objectives, and strategies in that same plan; and
   III) how the activity is consistent and complies with any regional trigger or limit established under the management frameworks detailed under the applicable regional plan or any notices issued in response to the exceedance of a regional trigger or limit.

B) The applicant must retain the information for requirement A at all times and provide it on request unless otherwise indicated below. The information must be sufficient to allow the AER to assess an application under the applicable regional plan.

C) The applicant must submit the information from requirement A if the proposed activity to be located within the boundary of an approved regional plan
   I) is also within the boundaries of a designated conservation area, a provincial park, a provincial recreation area, or a public land area for recreation and tourism;
   II) is inconsistent with the land uses established in the applicable regional plan or any of the outcomes, objectives, and strategies in that same plan; or
   III) may result in the exceedance of a trigger or limit or contravene a notice issued in response to an exceedance of a trigger or limit.

D) The applicant must submit the information from requirement A if it believes that its proposed activity is permitted under the applicable regional plan because it is "incidental" to previously approved and existing activities. The applicant must also provide information to support its position.

The AER has no authority to waive compliance with or vary any restriction, limitation, or requirement regarding a land area or land use under a regional plan. Applicants that wish to seek this type of relief must apply directly to Alberta's Land Use Secretariat established under the *Alberta Land Stewardship Act*. The stewardship minister may, on application and by order, vary the requirements of a regional plan. For more information, contact Alberta's Land Use Secretariat by phone at 780-664-7972 or by e-mail to LUF@gov.ab.ca.

For more information on the requirements above, refer to *Bulletin 2014-28: Application Requirements for Activities within the Boundary of a Regional Plan* or e-mail regional.plans@aer.ca. This bulletin rescinds and replaces *Bulletin 2012-22: Application Procedures for Approval of Activities Located In or Near the Boundaries of the Lower Athabasca Regional Plan*, which is an earlier bulletin that was issued regarding the AER's compliance with approved regional plans under the *Alberta Land Stewardship Act*.

Alberta
Energy
Regulator

Directive 065

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Resources Applications for Oil and Gas Reservoirs

The Alberta Energy Regulator (AER) has approved this directive on April 5, 2016.

<original signed by>

Jim Ellis
President and Chief Executive Officer

Contents

How to Use This Directive 7
  Introduction 7
  What This Directive Contains 8
  What's New in *Directive 065* 9
  Procedure for Reviewing Application 9
  Concerns/Dispute Resolution 11
  Documented Decisions/Compliance 11
  Voluntary Self-Disclosure 12

Schedule 1—Resources Applications 17

Resources Applications Notification Guidelines 19
  When to Notify 19
  Whom to Notify 19
  How to Conduct Notification 19
  Consequences of Incomplete Notification 20
  Responding to Concerns Raised During the Notification Process 20

Unit 1 Equity 1-1
  1.1 Application for a Rateable Take Order 1-1
    1.1.1 Background 1-1
    1.1.2 When to Make This Application 1-1
    1.1.3 How the AER Processes the Application 1-1
    1.1.4 Requirements for an Application for a Rateable Take Order 1-3
  1.2 Application for a Common Purchaser Order 1-7
    1.2.1 Background 1-7

1.2.2 When to Make This Application 1-7
1.2.3 Terms of Application 1-7
1.2.4 How the AER Processes the Application 1-8
1.2.5 Requirements for an Application for a Common Purchaser Order 1-9
1.3 Application for a Common Carrier Order 1-15
1.3.1 Background 1-15
1.3.2 When to Make This Application 1-15
1.3.3 Terms of Application 1-15
1.3.4 How the AER Processes the Application 1-16
1.3.5 Requirements for an Application for a Common Carrier Order 1-17
1.4 Application for a Common Processor Order 1-24
1.4.1 Background 1-24
1.4.2 When to Make This Application 1-24
1.4.3 Terms of Application 1-24
1.4.4 How the AER Processes the Application 1-25
1.4.5 Requirements for an Application for a Common Processor Order 1-26
1.5 Application for a Compulsory Pooling Order 1-34
1.5.1 Background 1-34
1.5.2 How the AER Processes the Application 1-35
1.5.3 Requirements for an Application for a Compulsory Pooling Order 1-36
1.6 Special Drilling Spacing Unit .... rescinded

Unit 2 Conservation 2-1
2.1 Application for an Enhanced Recovery Scheme 2-1
2.1.1 Introduction 2-1
2.1.2 AER Requirements and Expectations for ER Schemes 2-5
2.1.3 Requirements for ER Scheme Applications 2-8
2.1.4 ER Related Processes 2-25
2.2 Enhanced Oil Recovery Project .... rescinded
2.3 Enhanced Recovery Recognition and Good Production Practice for Enhanced and Oil Recovery Schemes .... rescinded
2.4 Application for Concurrent Production 2-27
2.4.1 Background 2-27
2.4.2 When to Make This Application 2-27
2.4.3 Terms of Approval 2-27
2.4.4 Requirements for an Application for Concurrent Production 2-28
2.5 Application for Pool Delineation and Ultimate Reserves 2-32
2.5.1 Background 2-32
2.5.2 When to Make This Application 2-32
2.5.3 How the AER Processes the Application 2-33

2.5.4 Requirements for an Application for Pool Delineation 2-34
2.5.5 Requirements for an Application for Ultimate Reserves 2-34

Unit 3 Production Control 3-1
3.1 Commingled Production 3-1
3.1.1 Background 3-1
3.1.2 Processes for the Management of Commingled Production 3-1
3.1.3 AER Expectations, Notification Requirements, and Compliance Assurance for All Commingled Production 3-2
3.1.4 Determination of Commingling Process to Use 3-7
3.1.5 Unsegregated Gas Production Within a DE 3-7
3.1.6 SD Unsegregated Production 3-10
3.1.7 Explanatory Notes to Determine if the DE or SD Processes May Be Used 3-15
3.1.8 Approval to Commingle Production Through an Application 3-20
3.2 Background to Good Production Practice, Gas-Oil Ratio Penalty Relief, and Special Maximum Rate Limitation 3-35
3.3 Application for Good Production Practice—Primary Depletion Pools 3-36
3.3.1 Requirements for an Application for GPP 3-37
3.4 Application for Gas-Oil Ratio Penalty Relief 3-41
3.4.1 Using the O-33 Form 3-41
3.4.2 Requirements for an Application for GOR Penalty Relief 3-41
3.5 Application for Special Maximum Rate Limitation (MRL) 3-42
3.5.1 Requirements for an Application for a Special MRL 3-42
3.6 Application to Amend or Rescind a Gas Allowable Order 3-43
3.6.1 Background 3-43
3.6.2 When to Make This Application 3-43
3.6.3 How the AER Processes the Application 3-44
3.6.4 Requirements for an Application to Amend or Rescind a Gas Allowable Order 3-44

Unit 4 Disposal/Storage 4-1
4.1 Application for Disposal (Classes I–IV) 4-1
4.1.1 Background 4-1
4.1.2 When to Make This Application 4-1
4.1.3 Application Requirements for a Disposal Scheme 4-2
4.1.4 Additional Requirements for Class I Disposal 4-11
4.1.5 Additional Requirements for Class III Disposal 4-12
4.1.6 Disposal Scheme Amendment 4-16
4.2 Application for Underground Gas Storage 4-16
4.2.1 Background 4-16
4.2.2 Terms of Application 4-17
4.2.3 Application Requirements for Underground Gas Storage 4-17

Unit 5 Approval Transfers ... 5-1
  5.1 Approval Transfer for Change of Approval Holder ... 5-1
    5.1.1 Background ... 5-1
    5.1.2 Requirements for an Application for a Change of Approval Holder for Schemes ... 5-1
Unit 6 Gas and Ethane Removal ... 6-1
  6.1 Background ... 6-1
  6.2 When to Make This Application ... 6-1
  6.3 Applications for Gas and Ethane Removal ... 6-1
    6.3.1 Short-Term Gas Removal Application Form ... 6-2
    6.3.2 Long-Term Gas Removal Application Form ... 6-2
    6.3.3 Short-Term Ethane Removal Application Form ... 6-3
    6.3.4 Long-Term Ethane Removal Application Form ... 6-4
  6.4 Reporting Natural Gas and Ethane Removed from Alberta ... 6-4
  6.5 Requirements for an Application for a Short-Term Gas Removal Permit ... 6-5
  6.6 Requirements for an Application for a Long-Term Gas Removal Permit ... 6-8
  6.7 Requirements for an Application for a Short-Term Ethane Removal Permit ... 6-14
Unit 7 Application for Special Well Spacing ... 7-1
  7.1 Introduction ... 7-1
  7.2 Background ... 7-1
    7.2.1 Standard Drilling Spacing Units, Target Areas, and Baseline Well Densities ... 7-1
    7.2.2 Fractional Tracts of Land ... 7-4
    7.2.3 Standard Buffer Zones for Holdings ... 7-5
    7.2.4 Spacing and Horizontal/Multilateral Wells ... 7-6
    7.2.5 When to File a Spacing Application ... 7-7
    7.2.6 How to Make a Spacing Application ... 7-8
    7.2.7 Types of Spacing Applications ... 7-8
  7.3 Application Requirements and Expectations ... 7-10
    7.3.1 Minimum Notification Requirements ... 7-10
    7.3.2 Minimum Equity and Conservation Requirements ... 7-13
    7.3.3 Production Information and Volumetric Reserves Requirements ... 7-15
    7.3.4 Reserves Information Requirements ... 7-16
  7.4 How the AER Processes the Application ... 7-17
    7.4.1 Quick Application Path ... 7-17
    7.4.2 Standard Application Path ... 7-18
    7.4.3 Nonstandard Application Path ... 7-19
    7.4.4 Processing Paths for Different Spacing Application Types ... 7-19
    7.4.5 Applications with Outstanding Objections ... 7-20
    7.4.6 AER Spacing Application Decision Tree ... 7-20
  7.5 Attachments Required for a Special Well Spacing Application ... 7-22

7.6 Explanatory Notes for Application Form Questions 7-23
    7.6.1 Schedule 1—Resources Applications 7-23
    7.6.2 Spacing Form 7-23
    7.6.3 Well Productivity and Volumetric Data Form 7-25

Appendices

A References A-1

B Sample Template of Company-to-Company Notification B-1

C Application for Gas-Oil Ratio (GOR) Penalty Relief (form O-33) C-1

D Transfer of Approval D-1

E AER Staff Contacts .... rescinded

F Enhanced Recovery (ER) Scheme Application Form F-1

G Gas and Ethane Removal Forms G-1

H Gas Reserves Data Sheet H-1

I EAS Well Spacing Application Forms and Explanatory Notes I-1

J Special Well Spacing Notification Templates J-1

K Special Well Spacing Attachment Examples K-1

L Standard Target Areas and Buffer Zones L-1

M Target Area Descriptions for Special Well Spacing Before October 6, 2011 .... M-1

N Special Well Spacing Declaration Templates N-1

O Step-Rate Injectivity Test O-1

Tables

1 Minimum notification requirements required prior to filing application 21
2 Minimum consultation requirements prior to filing applications 22
3 Minimum notification requirements prior to AER decision 22
3.1 Notification requirements for commingling applications 3-6
3.2 Summary of requirements for commingling on a well, pool, or area basis 3-22
7.1 EAS attachment types 7-22
7.2 Production and volumetric data form fields and values 7-28

Figures

1 Resources applications process 13
2 Resources applications evaluation 14
3 Well spacing applications evaluation 15
2.1 Decision tree for the quick enhanced recovery application process 2-3
3.1 Decision tree to determine process to commingle production 3-7
3.2 Decision tree for the commingling of gas production from intervals within a development entity (DE) 3-9
3.3 Decision tree to determine if the proposed commingling is a candidate for self-declared gas commingling in a well 3-12
3.4 Decision tree to determine if the proposed commingling is a candidate for self-declared oil commingling in a well 3-14
7.1 *OGCR* Schedule 13A 7-2
7.2 *OGCR* Schedule 13B 7-4
7.3 Example of producing horizontal/multilateral legs from a single DSU 7-6
7.4 Example of a horizontal oil well drilled across adjacent quarter-section DSUs of common mineral rights ownership 7-7
7.5 Quick application path 7-18
7.6 Standard application path 7-19
7.7 AER decision tree for holding/unit applications 7-21

How to Use This Directive

Directive 065 details the process to apply to the Alberta Energy Regulator (AER) for all necessary approvals to implement the strategy and plan to deplete a pool or portion of a pool using one resource application. Previously, the requirements were mainly found in part 15 of the *Oil and Gas Conservation Rules* (*OGCR*).

This directive also enables you to review in a single document the application requirements and the explanations for those requirements for most conventional oil and gas reservoir topics considered in an application for AER approval. "Must" indicates a requirement for which compliance is required and is subject to AER enforcement, while "recommends" indicates a best practice that can be used but is not an AER requirement and does not carry an enforcement consequence. The AER will conduct periodic reviews of this directive's continued usefulness for applicants and conduct updates based on feedback received.

Questions about application types discussed in *Directive 065* may be directed to the Resources Applications help line at 403-476-4967 or Resources.Applications@aer.ca.

Introduction

Specific resource applications are required to allow the AER and potentially affected parties, often with competing interests, to understand and test the appropriateness or impact of depletion plans at critical milestones. Other resource applications may address revisions to the baseline set of depletion or equity rules and reservoir descriptions. Some resource applications address known equity disputes arising from different ownership, limited opportunity to produce, or access constraints to established facilities. If such issues are not resolved, these applications go directly to a hearing.

The AER reviews all resource applications to ensure that the appropriate level of reservoir engineering and geological science is applied in managing poolwide depletion and that potential impacts on other stakeholders are identified and dealt with fairly. Because individual reservoirs are unique, detailed assessments may be necessary to ensure that the depletion plan is appropriate and recovery is in the public interest. You must provide sufficient up-front information and analysis to support the reasonableness of your applications.

The AER has compiled this comprehensive directive to support a level playing field for all applicants. Applicants are expected to know and understand requirements and file accurate and complete applications. AER staff will not complete missing application requirements, such as raw data collection and supporting analytical discussion. Instead, AER staff will test assumptions, check completeness and accuracy of data and assessments, and test alternatives.

What This Directive Contains

This directive includes Resources Applications – Schedule 1 registration form, guidelines on notification requirements, and seven units that address detailed information requirements for specific regulatory topics, as well as appendices giving reference sources and other support information.

Applicants must prepare the following resources applications using the on-line Schedule 1 form. This will provide the AER with key information about the applicant, the type of application, the area of application, and details of notice to potentially affected parties undertaken by the applicant.

The resources applications for which this directive applies are divided into units as follows:

1) **Equity**: rateable take, common purchaser, common carrier, common processor, and compulsory pooling
2) **Conservation**: enhanced recovery scheme (gas cycling, waterflood, immiscible gas flood, miscible flood), concurrent production, and pool delineation and ultimate reserves
3) **Production Control**: commingled production, good production practice (primary depletion pools), gas-oil ratio penalty relief, special maximum rate limitation, and gas allowable
4) **Disposal/Storage**: disposal (water and waste), acid gas disposal, and underground gas storage
5) **Approval Transfers**: change in name of the holder of an AER approval and change in holder of an AER approval
6) **Gas and Ethane Removal**: short and long-term natural gas removal, short-term ethane removal.
7) **Special Well Spacing**: holdings or units, special drilling spacing units, rescind a special drilling spacing unit, rescind a holding or unit, and modify spacing.

The appendices include

- list of references
- notification templates
- application for gas-oil ratio penalty relief (form O-33)
- transfer of approval form
- enhanced recovery scheme application form
- gas and ethane removal application forms
- gas reserves data sheet
- EAS well spacing application forms and explanatory notes

- special well spacing notification templates
- special well spacing attachment examples
- standard target areas and buffer zones
- target area descriptions for special well spacing before October 6, 2011

You are strongly encouraged to become familiar with the references listed in appendix A before completing your application.

What's New in *Directive 065*

In this edition of *Directive 065*, all references to *Directive 019: Compliance Assurance*, which has been rescinded, and related information have been removed.

Procedure for Reviewing Application

Figure 1 shows the overall oil and gas resources applications process, figure 2 shows the oil and gas resources applications evaluation process, and figure 3 shows the well spacing applications evaluation process.

Step 1: Application Registration

All resources applications contained in this directive must be submitted electronically through DDS on the AER website at www.aer.ca. The AER assigns each application package a unique application number. This information is communicated to the applicant within minutes of the application registration. Applicants can also confirm the registration and contact information of their application by checking the Integrated Application Registry (IAR) Query, accessible from the Systems and Tools portal on the AER's website.

Note that all data must be submitted using metric units (SI).

Step 2: Corporate Record Check

All applications are subject to a corporate check to verify acceptable performance records and other information in AER files.

Applicants seeking formal approval must hold a valid company code issued by the AER's Liability Management Group. If you are a first-time applicant, you must obtain a company code by filing a corporate profile with the AER's Liability Management Group. Information packages are available from the Liability Management Group at LiabilityManagement@aer.ca. You must update your corporate profile when asked to do so by the AER.

AER approvals identify the applicant as the holder of the approval, and this party is responsible and accountable for compliance with all regulations and the approval conditions. Applicants requesting changes to a general order of the AER, reservoir description, and operational practices not requiring a change to an approval do not need to have a company code but must have a valid interest in the pool.

If you are on "refer" status due to an unresolved serious noncompliance problem, the AER may ask additional questions, including questions related to corporate accountability, technical competency, and corporate commitment to compliance with provincial standards. In the case of a "refer" status, the AER Executive Committee may be directly involved in the consideration of any application, which may include a decision to go to a hearing. Otherwise, the application is normally reviewed and, if appropriate, approved by the delegated work groups within the AER.

Step 3: Application Returned or Delayed if Incomplete

Effective October 1, 2000, the AER will no longer process an application identified in this directive if it is substantially incomplete (i.e., has a major deficiency). It will be returned to you with an explanation. An example of such a major deficiency is the complete omission of an entire key information segment of any unit requirements, such as the geological description. If the application has minor deficiencies, such as lacking specific information needed to make a decision, you will be provided with a clear explanation and given five working days to respond. Failure to respond in this time frame will result in the AER closing and returning your application with written notification of the reason. The AER is prepared to correct small errors in the submitted information, as long as applicants show improvement in submitting better-quality applications.

Note that if the AER returns a severely deficient and incomplete application that you filed in response to an AER request, such as for improvement in recovery or operational performance, you will be subject to any consequences or penalties previously identified at the time of the request.

Step 4: Application Evaluation

This directive identifies some circumstances that may reduce application requirements and, in turn, result in a faster decision on the application. You may want to consider the long-term benefits of creating some of these circumstances, such as equity agreements and poolwide plans, before you file a competitive, partial pool application.

The evaluation of your application may also be expedited if your definition of the pool extent is consistent with the AER's pool designation or you provide a discussion on any variances. The failure to resolve significant differences, such as pool delineation, before the application is filed could add considerable time to the application process and raise issues that are better dealt with beforehand.

When evaluating an application, the AER reviews a pool's unique features, if any, to assess whether additional information, analysis, or consultation beyond what is identified in the directive is required. As explained in the Resources Applications Notification Guidelines and individual units of this guide, in those cases where the applicant has chosen to conduct notification the AER will require submission of documentation describing your notification program. The AER will review this evidence, especially the written notice or other correspondence, showing that you have contacted all potentially affected parties and provided them with a fair opportunity to learn about your planned application and to submit their views to you and the AER.

Concerns/Dispute Resolution

The AER expects applicants to conscientiously address all relevant concerns raised by potentially adversely affected parties. Should disputes arise, the AER expects the parties to discuss the issues and options for resolution, including the use of third-party mediators. AER staff, if requested, can assist in explaining AER rules and in facilitation.

If you conclude that further discussion is unlikely to resolve issues, you should inform the AER, outlining concerns, steps you have taken to resolve problems, and your recommended course of action. Note that outstanding statements of concerns can result in an AER hearing. Should a hearing be called, both you and the intervener may be asked to file additional substantiating evidence. Matters of confidentiality and disclosure should be addressed and determined by the parties prior to submission of this evidence.

Documented Decisions/Compliance

AER decisions on the resource applications listed in this directive are issued in written format and generally include a letter and either a formal site-specific approval or a regional or provincial order.

AER requirements for resource activities covered by *Directive 065* are set out in the *Oil and Gas Conservation Act*, *OGCR*, this directive, and conditions of approval. These are the requirements that you have a legal obligation to meet.

You must not assume that an approval has or will be granted just because an application has been submitted.

If an unauthorized activity occurs or if conditions of approval are not met, immediate corrective action, such as the shut-in of well operations, is required. See specific sections of *Directive 065* for details of compliance requirements.

Voluntary Self-Disclosure

Licensees are encouraged to actively monitor compliance using tools such as surveillance and audits. Send self-disclosure information to

E-mail: ResourceCompliance@aer.ca
Fax: 403-297-8122
Mail: Alberta Energy Regulator
Resources Applications, Enforcement and Surveillance Section
Suite 1000, 250 – 5 Street SW
Calgary, Alberta T2P 0R4

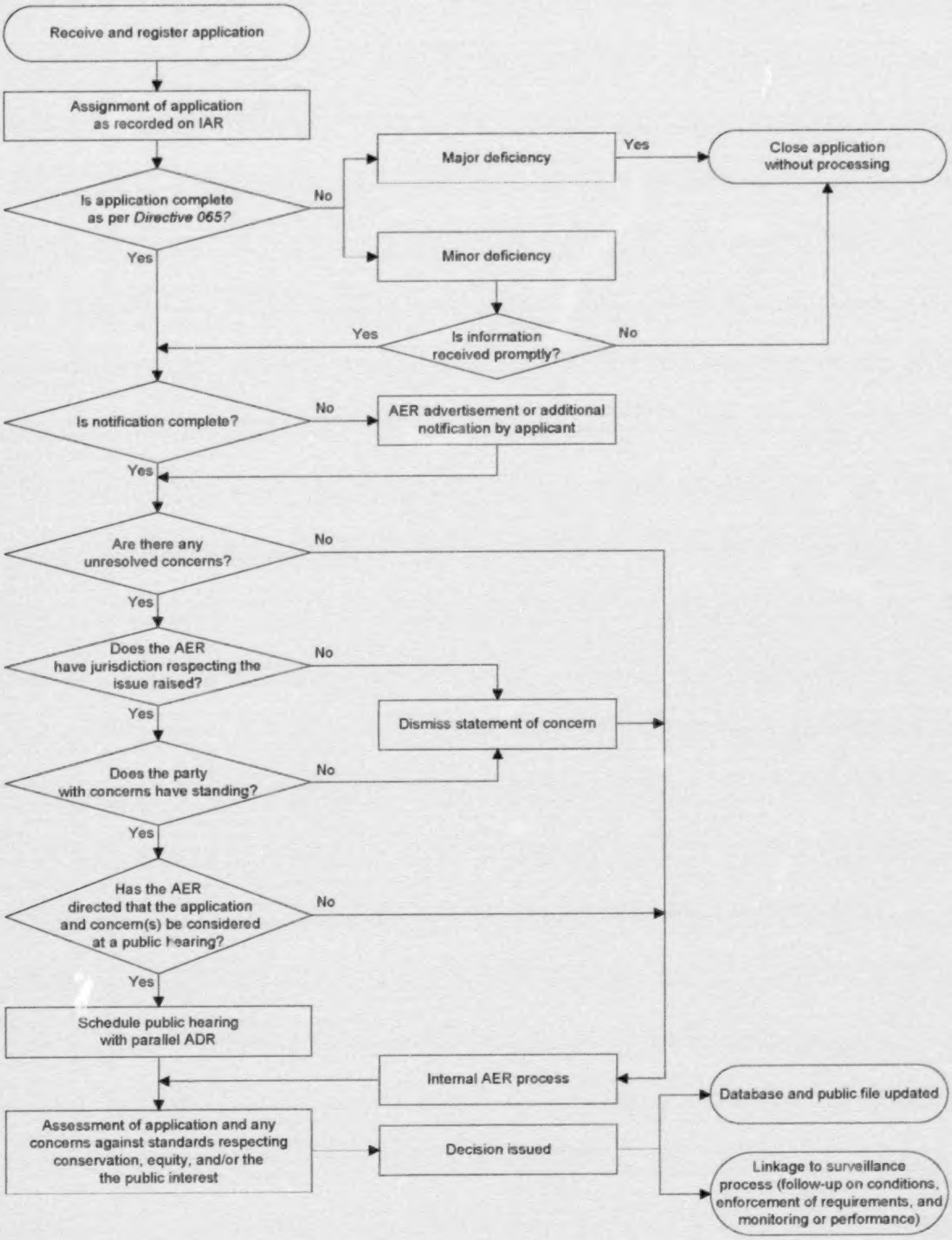
Receive and register application
Assignment of application as recorded on IAR
Is application complete as per *Directive 065?*
No
Major deficiency
Yes
Close application without processing
Minor deficiency
Yes
Is information received promptly?
Yes
No
Is notification complete?
No
AER advertisement or additional notification by applicant
Yes
Are there any unresolved concerns?
No
Yes
Does the AER have jurisdiction respecting the issue raised?
No
Yes
Dismiss statement of concern
Does the party with concerns have standing?
No
Yes
Has the AER directed that the application and concern(s) be considered at a public hearing?
No
Yes
Schedule public hearing with parallel ADR
Internal AER process
Database and public file updated
Assessment of application and any concerns against standards respecting conservation, equity, and/or the the public interest
Decision issued
Linkage to surveillance process (follow-up on conditions, enforcement of requirements, and monitoring or performance)

Figure 1. Resources applications process

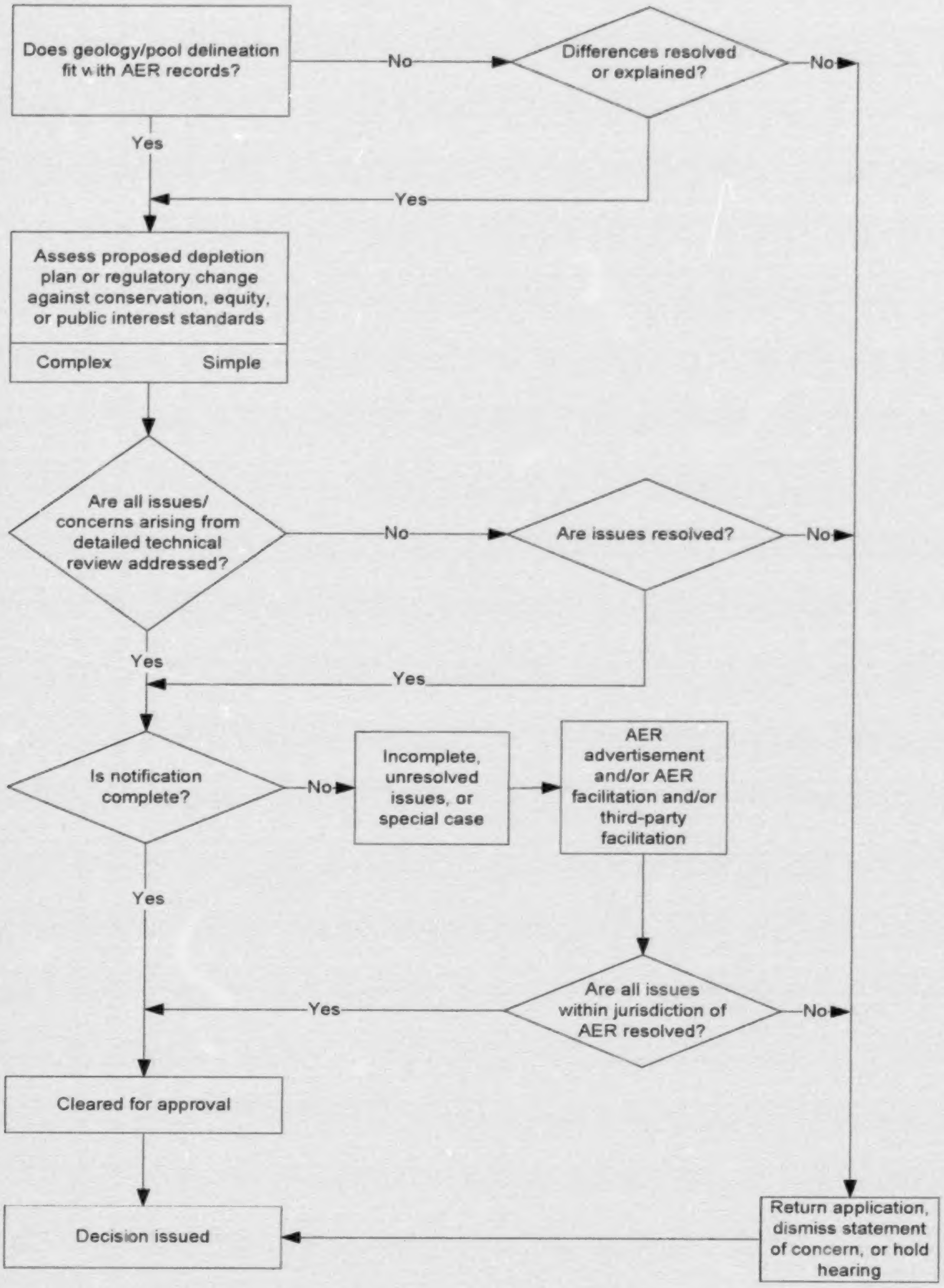
Does geology/pool delineation fit with AER records?
No
Differences resolved or explained?
No
Yes
Yes
Assess proposed depletion plan or regulatory change against conservation, equity, or public interest standards
Complex
Simple
Are all issues/ concerns arising from detailed technical review addressed?
No
Are issues resolved?
No
Yes
Yes
Is notification complete?
No
Incomplete, unresolved issues, or special case
AER advertisement and/or AER facilitation and/or third-party facilitation
Yes
Are all issues within jurisdiction of AER resolved?
Yes
No
Cleared for approval
Decision issued
Return application, dismiss statement of concern, or hold hearing

Figure 2. Resources applications evaluation

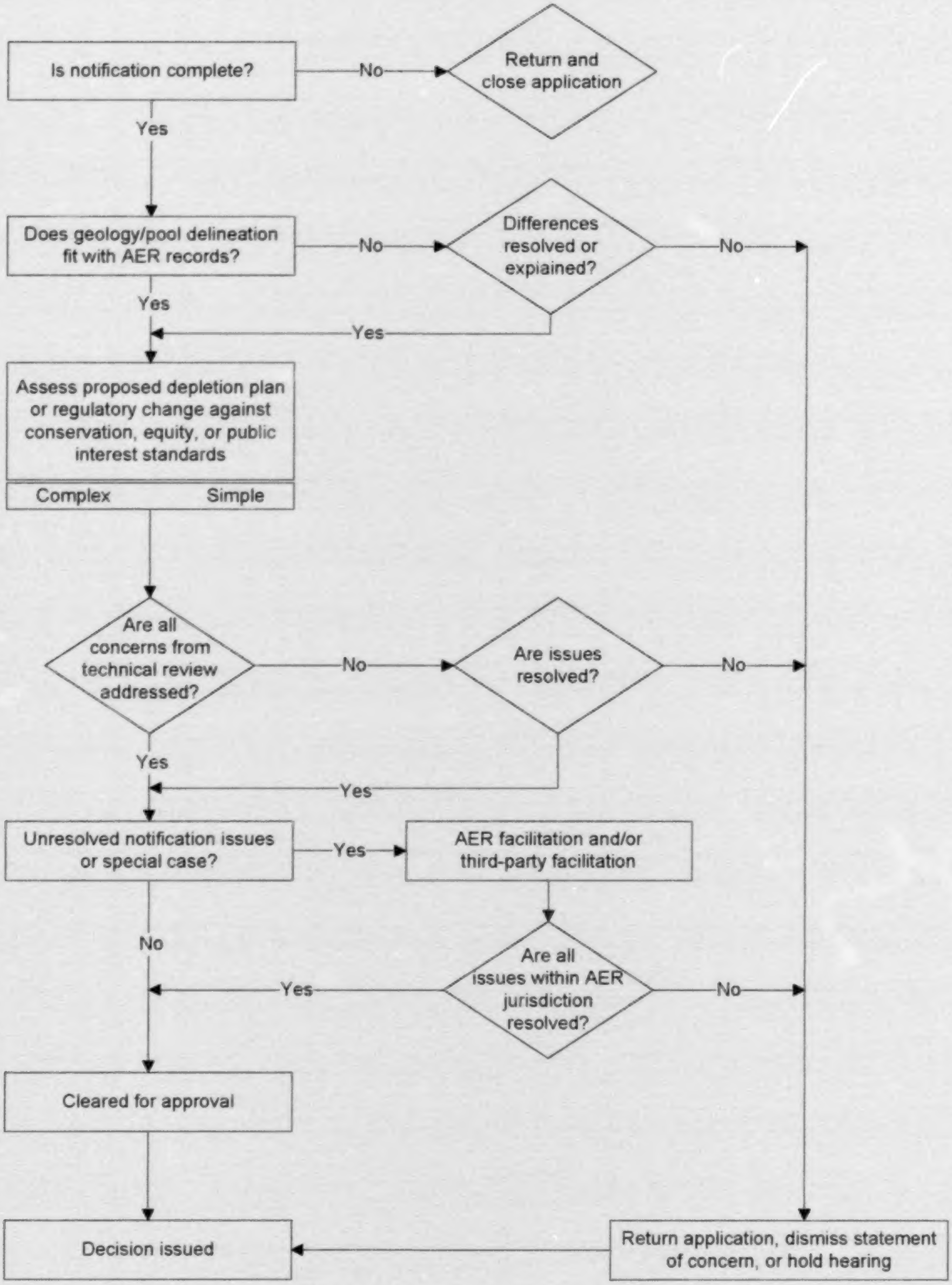
Is notification complete?
No
Return and close application
Yes
Does geology/pool delineation fit with AER records?
No
Differences resolved or explained?
No
Yes
Yes
Assess proposed depletion plan or regulatory change against conservation, equity, or public interest standards
Complex
Simple
Are all concerns from technical review addressed?
No
Are issues resolved?
No
Yes
Yes
Unresolved notification issues or special case?
Yes
AER facilitation and/or third-party facilitation
No
Are all issues within AER jurisdiction resolved?
Yes
No
Cleared for approval
Decision issued
Return application, dismiss statement of concern, or hold hearing

Figure 3. Well spacing applications evaluation

Alberta Energy Regulator

Resources Applications - Schedule 1

Applicant General Information

DAY MONTH YEAR ____________ APPLICATION # ________ APPLICANT'S FILE NUMBER ____________

The applicant certifies that the information provided here and in all supporting documentation is correct and in accordance with all regulatory requirements or as directed by the Alberta Energy Regulator.

SUBMISSION STATUS New SUBMISSION ID ________ CREATION DATE ________

1. APPLICANT INFORMATION

COMPANY NAME ____________ BA CODE ________

CONTACT NAME ____________

TELEPHONE ________ FAX ________

E-MAIL ____________

MAILING ADDRESS ____________

2. APPLICATION TYPE

(For Electronic Submission purposes, Resources Applications only accepts one application type per submission)

APPLICATION DESCRIPTION

3. LOCATION (Minimum input Twp/Rg/Mer)

LE	Lsd	Sec	Twp	Rge	Mer	ES		LE	Lsd	Sec	Twp	Rge	Mer	ES	
					W								W		
					W								W		
					W								W		
					W								W		
					W								W		

4. FIELD AND POOL LIST

Field Name	Pool Name
-	-

5. OWNERSHIP AND NOTIFICATION INFORMATION

1. What is the ownership basis on which you make this application?

2. Has notification been conducted in accordance with the requirements for this application? Yes ☐ No ☐

2a. If no, do you need AER assistance to complete the notification requirements? Please explain. Yes ☐ No ☐

3. Are there outstanding concerns? Yes (please explain) Yes ☐ No ☐

SUBMISSION STATUS New SUBMISSION ID ______ CREATION DATE ______

6. FUTURE APPLICATIONS

1. Have you, or do you plan to submit additional Resources Applications associated with the present application to the AER? Yes ☐ No ☐

1a. If yes, state the type of applications or the application numbers (if known):

Application Type	Application Number (If applicable)

If you have any questions or comments, please contact the EAS Administrator.

Resources Applications Notification Guidelines

When to Notify

Effective notification and consultation programs are critical not only to ensure an efficient regulatory process but to promote long-term relationships. The AER prefers, and requires for some resource application types, that both industry and public (where required) notification be completed prior to the filing of the applications.

Whom to Notify

Minimum notification requirements for specific types of resources applications are included in tables 1, 2, and 3 of this section. In addition to meeting the minimum notification requirements, the AER expects you to review your situation and consider whether there are potentially directly and adversely affected parties outside the minimum notification areas and, if so, also provide notification to these parties.

In some cases, the AER requires notification for informational purposes only. This type of notification provides information regarding a potential development to support, promote, and encourage early and ongoing discussions between parties.

How to Conduct Notification

Notification is the first step in providing information and is usually conducted through written correspondence, while consultation must occur face to face or by telephone. Early, proactive notification programs are more likely to result in positive relationships. To this end, the AER believes that newspaper advertisement may not meet these objectives and should only be used to supplement direct notification in extenuating circumstances. If you know there will be contentious or complex issues respecting a resources application, personal consultation may be preferable as a first step rather than notification. Notification programs that do not provide for direct notice to a person should be discussed with the AER prior to conducting the program.

You should provide notification of a proposed application by means of a letter that includes adequate information to allow persons to understand the proposed development and the impact that it may have on them. Formats for notification letters are included in appendix B (for well spacing notification templates, see appendix J). Notification must take into consideration whether the person being notified is an oil and gas company, a Freehold mineral owner, or a landowner or occupant. You must include applicant contact information in the notification letter, as well as directions about what action a person should take if there is a concern. Stakeholders should be directed to submit any concerns directly to the applicant, but with the option to submit them directly to the AER.

In providing notification, you must take possible delays in delivery of the notification package into consideration. Each person notified must be given a minimum of 15 working days from the date the letter is mailed to respond. A signed letter of consent or nonobjection to the proposal is not required. However, it should be clear in the letter that if the person notified does not respond to the notification package, filing (if not filed) and processing of the application with the AER will proceed without further contact.

Consequences of Incomplete Notification

For some application types, the AER requires that you provide a description of your notification program and documented evidence of the results in your application, including a list of the persons notified and a copy of the notification letter.

The AER will review your notification information to ensure that you have met the requirements in this directive. Should it be determined that the notification provided was inadequate, the application, in most cases, will be **closed**.

If an application has been approved without a hearing, a directly and adversely affected party may file an application with the AER for a regulatory appeal and an appeal hearing may be held. The approval may be suspended pending the outcome of the regulatory appeal.

Responding to Concerns Raised During the Notification Process

The AER expects applicants to engage in meaningful discussions with any person who has raised concerns or has questions respecting a proposed application. It is expected that applicants will make substantial efforts to resolve the matter prior to filing and during the review of a resources application, including use of third-party mediators, as discussed in the AER's Alternative Dispute Resolution (ADR) program described in AER *Manual 004: Alternative Dispute Resolution Program and Guidelines for Energy Industry Disputes*.

If an applicant has made no attempt to respond to a person who has expressed concerns or is seeking understanding or answers to questions, the application, in most cases, will be **closed**.

The AER recognizes that discussions may come to an impasse or that a person who has expressed concerns may decline to participate in the ADR process. Additionally, in some cases, a company may consider the statement of concern to be not relevant to the issues of the application and that beyond initial efforts it should not be required to attempt to resolve the issue. In these cases, the company may proceed to file its application (if not filed) and to include any statements of concern about the application, its response to the statements of concern, and a discussion of its view of how the AER should proceed with the application.

Table 1. Minimum notification requirements required prior to filing application[1]

Application type (section in *Directive 065*)	Parties to notify	Area of notification
Special well spacing (Unit 7)	• Refer to Unit 7 for notification requirements	
EOR scheme (amendment) (2.1)	• All licensees of abandoned wells that penetrated the pool and licensees of wells completed in the pool	The applied-for approval area and the area within 800 m of any proposed enhanced oil recovery injector
EOR scheme (new) (2.1)	• All licensees of abandoned wells that penetrated the pool and licensees of wells completed in the pool	The applied-for approval area and the area within a quarter section of the applied-for approval area
Gas cycling scheme (amendment)	• All licensees of abandoned wells that penetrated the pool and licensees of wells completed in the pool	The applied-for approval area
Gas cycling scheme (new)	• All licensees of abandoned wells that penetrated the pool and licensees of wells completed in the pool	The applied-for approval area and the area within one section of the applied-for approval area
Concurrent production (2.4)	• Unit operator (if applicable) • Approval holder of scheme (if applicable) • All well licensees	AER-designated pool
Waste disposal (Class I)[2] (4.1)	Industry • Unit operator (if applicable) • Approval holder of scheme • All well licensees, including those of abandoned wells • All mineral lessees • All mineral lessors	A radius of 1.6 km from the proposed disposal well where the disposal zone is known to be present
	Public • Landowners and occupants	A radius of 0.5 km from the proposed disposal well
Acid gas disposal[3] (4.1)	• Unit operator (if applicable) • Approval holder of scheme (if applicable) • All well licensees, including those of abandoned wells • All mineral lessees • All mineral lessors	If into a depleted hydrocarbon pool, the AER-designated pool; if into an aquifer, a radius of 1.6 km from the section containing the disposal well

[1] These are minimum requirements. The consequences of incomplete notification are discussed in the preceding text.

[2] Notification and consent may be required as part of any request for a surface facility approval associated with waste disposal as per *Directive 058: Oilfield Waste Management Requirements for the Upstream Petroleum Industry*. A surface facility approval must be obtained from the AER's Facilities Applications Group and/or Alberta Environment and Sustainable Resource Development before an approval for a waste disposal well can be issued.

[3] If a new emergency response plan (ERP) is needed or an existing ERP is updated, consult *Directive 071: Emergency Preparedness and Response Requirements for the Upstream Petroleum Industry* for the requisite notification requirements for ERP purposes.

Table 2. Minimum consultation requirements prior to filing applications

Application type (section in *Directive 065)*	Consultation and documentation of negotiations with	Area of contact
Rateable take (1.1)	• All well licensees	AER-designated pool if present; otherwise applicant's pool interpretation
Common carrier/processor/ purchaser (1.2, 1.3, 1.4)	• Carrier, processors, or purchasers involved • All well licensees	Not applicable In pool
Compulsory pooling (1.5)	• All mineral lessees • All mineral lessors of unleased tracts	AER-designated drilling spacing unit

Table 3. Minimum notification requirements prior to AER decision[1]

Application type (section in *Directive 065*)	Parties to notify	Area of contact
Project and enhanced recovery recognition status	• Not applicable	Not applicable
Commingled production (3.1)	• Refer to section 3.1 for notification requirements	
Good production practice/ special maximum limitation/gas-oil ratio penalty relief (3.2.2, 3.2.3, 3.2.4)	• Unit operator (if applicable) • Approval holder of scheme (if applicable) • All well licensees	AER-designated pool
Gas allowable (3.3)	• Unit operator (if applicable) • Approval holder of scheme (if applicable) • All well licensees	AER-designated pool plus 1600 m surrounding the pool
Disposal except waste disposal (Class I) and acid gas disposal (4.1)	• Unit operator (if applicable) • Approval holder of scheme (if applicable) • All well licensees, including those of abandoned wells	A radius of 1.6 km from the proposed disposal well where the proposed disposal zone is known to be present
Underground gas storage (4.2)	• Unit operator (if applicable) • Approval holder of scheme (if applicable) • All well licensees, including those of abandoned wells • All mineral lessees • All mineral lessors	The AER-designated pool boundary of the proposed storage pool and a 1.6 km radius from that pool boundary; notification should cover all zones, including those that overlie and underlie the storage pool

[1] These are minimum requirements. The consequences of incomplete notification are discussed in the preceding text.

Unit 1 Equity

1.1 Application for a Rateable Take Order

1.1.1 Background

The purposes of the *Oil and Gas Conservation Act* (*OGCA*) are, among other things, to effect the conservation of oil and gas resources, to afford each owner the opportunity of obtaining its share of the production of oil or gas from any pool, and to provide for economic, orderly, and efficient development in the public interest. Section 36 of the *OGCA* mandates the AER to address all three of these purposes. Historically this legislation has been used only in the equity context and to allow for economic, orderly, and efficient development; other sections of the *OGCA* have been used to ensure conservation of resources.

Under section 36, the AER may limit the amount of gas that may be produced and/or distribute the amount of gas that may be produced from a pool or part of a pool. Historically, this legislation has been used to authorize the distribution of gas production among wells in a nonassociated gas pool.

1.1.2 When to Make This Application

A situation that could warrant an application under section 36 of the *OGCA* would typically involve a number of gas wells of different ownership in a pool being on production. One owner believes its reserves are being inequitably drained because its well has been placed on production at rates that do not allow the well to capture the owner's share of the pool reserves. The well's rate may be restricted by pipeline or processing capacity or by a gas sales contract.

In the case where the rate limitation is due to pipeline or processing capacity, the owner has capacity or its own facilities and believes that it would not represent economic, orderly, and efficient development to build or obtain additional capacity. Where the limitation is due to a gas sales contract, the owner has been unable to adjust the contract or produce gas in excess of the contract to allow for an equitable rate of production.

1.1.3 How the AER Processes the Application

The AER considers the issuance of a rateable take order to be a very significant action because it has the potential to override contractual arrangements put in place through normal business practices. Consequently, before approving an application, the AER requires an applicant to demonstrate that it is being deprived of the opportunity to obtain its share of production from the pool. The applicant must show that drainage has occurred and continues to occur or that it can be expected to occur with a very high degree of certainty. Additionally, the drainage must be a result of the applicant not having an opportunity to produce its share of production. The restriction in rate must not be due to limitation in well capability. The AER has previously ruled that where the only limitation on production is well capability, a producer is not being deprived of an opportunity to obtain an equitable share of production (*Decision 85-5*).

Each application for a rateable take order will likely proceed to a public hearing.

1.1.4 Requirements for an Application for a Rateable Take Order (file 12 copies)

Requirements	**Comments**
1) A statement of what is being requested, including a) a reference that the application is being made under section 36 of the *OGCA*, and b) the pool and wells to which the order would apply.	For example, HP Gas Company applies for an order under section 36 of the *OGCA* distributing gas production among wells in the Woodword Viking A Pool, which includes the wells with the unique identifiers of …
2) A discussion giving the reasons why you are requesting the order, including a description of the circumstances that in your opinion have led or will lead to an inequitable situation.	
3) Documentation showing your attempts to negotiate a solution to the problem, including a) identification of all parties involved and the nature of their issues and concerns, and b) an outline of the attempts to resolve the issues, including type of discussions held, timing, and frequency.	You must have made substantial efforts to resolve the situation; the application should be a final resort. You should also continue your efforts to resolve the matter on a voluntary basis (including consideration of a third-party mediator) after the application has been filed with the AER. Your discussion must include why the negotiations did not lead to a settlement and what dispute resolution efforts were conducted. Matters of confidentiality and disclosure should be addressed and determined by the parties prior to submission of the application.
4) Your geological interpretation of the pool involved, including	This information should show that your well is part of the subject pool. The net pay map should

a) a net pay isopach map of the pool, including both oil and gas if there is an associated pool;

b) an interpreted and annotated log cross-section or representative well log(s) showing

   i) stratigraphic interpretation of the zone(s) of interest,

   ii) interpretation of fluid interfaces present,

   iii) completions and treatments to the wellbore(s), with dates,

   iv) cumulative production,

   v) finished drilling date and kelly bushing (KB) elevation, and

   vi) the scale of the log readings; and

show the entire pool and illustrate wells outside the pool that control the edges of the pool.

If there is a dispute among the parties involved regarding the delineation of the pool(s) in question, an annotated cross-section should be included in the application; if there is no dispute respecting this issue, an annotated representative well log is sufficient for the purposes of the application.

c) a tabulation of the interpreted net pay, porosity, and water saturation for each well in the pool, along with the cutoffs, methodology, formulas, and constants used.

This allows the AER to assess your mapping and reserves calculation requested in the following item. In addition, these data may be used to allocate production (see item 8 below).

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5) An evaluation of the oil and gas reserves for the pool and for your lands, including

   a) an estimate of the initial oil volume and gas volume in place,

   b) an estimate of the oil and gas recovery factors,

   c) a description of the methods used in determining (a) and (b) above (e.g., material balance, volumetric analysis,

The reserves estimates confirm that there are reserves available for production.

model study, a comparison of analog pools), and	
d) the supporting data used in determining (a) and (b) above and the sources of the data (i.e., pressure/volume/temperature [PVT] properties and source, pressure data and source).	All data used in obtaining the reserves estimates should be provided so that your analysis can be duplicated using information supplied in this application.
6) Deliverability test data showing that your well is capable of producing at an economic rate from the pool to which the proposed order would apply.	A summary of the deliverability test data may be used provided the detailed test data have been filed in accordance with *Directive 040: Pressure and Deliverability Testing Oil and Gas Wells*.
7) Where drainage is alleged, a discussion including	
a) evidence showing that the reserves underlying your lands have been drained subsequent to the completion of your well in the pool, and	In cases where a well has remained shut in, drainage may be confirmed by summarizing at least two pressure tests taken on the well. If you are arguing that your currently producing well is not producing at sufficient rates to recover an equitable share of production, a comparison may be made between the actual produced volume from the well and the volume the well should have produced to obtain an equitable share of production. You should present a detailed calculation showing how you determined your equitable share of production.
b) an estimate of the total amount of inequitable drainage that has occurred from your lands since your well was completed in the pool, together with details of how the drainage was calculated.	
8) A discussion of your proposal as to how the AER should restrict or distribute production from the pool that includes	The AER usually distributes production among wells in a pool on a percentage basis, rather than setting any specific rate or volume. The proportion of production allocated to each well is commonly based on the following formula:
a) a tabulation of the proportion of production or rate of production that each well or group of wells should be allowed to produce, together with the	

details of how the proposed production scheme was obtained, and

b) if considered appropriate, the total production rate proposed for the pool, together with the details of how this rate was determined and why such a rate should be set, and

c) if specific rates are proposed under item 8(a),

    i) an indication of why rates, rather than a percentage allocation, are being proposed,

    ii) whether the proposed rates are economic for each well or group of wells, and

    iii) whether each well or group of wells would be capable of producing at the proposed rate.

Percentage of pool production for specific well = 100 × (wellbore net pay × porosity × gas saturation × area of spacing unit or validated area for specific well) / (sum of wellbore net pay × porosity × gas saturation × area of spacing units or validated areas for all wells)

Directive 032 and *Decision 91-8* discuss the AER's commonly used allocation formula and the validated area concept.

The AER has not commonly used mapping as a means to determine hydrocarbon pore volume in a spacing unit because in many cases such mapping is highly interpretative. The AER has not normally factored the deliverability of a well into an allocation formula to avoid disputes on what constitutes appropriate well testing. You may propose an allocation formula other than the commonly used one; however, you should include detailed justification as to why the AER should deviate from its usual practice in determining an allocation formula.

It is not usually necessary to limit the total rate of production (item 8[b]), but this remains an option. In respect of item 8(c), it is not the AER's usual practice to set specific rates, but this also remains an option. In some cases it may be useful to set minimum rates, with a percentage allocation above the minimum rate. If a well falls below the minimum rate, other wells are restricted only to their minimum rates and not below. Items 8(c)(ii) and 8(c)(iii) should be addressed only when there is likely to be a dispute about the economics of a proposed rate or about the capability of a well to produce at a specified rate.

1.2 Application for a Common Purchaser Order

1.2.1 Background

The *Oil and Gas Conservation Act* (the *OGCA*) affords each owner the opportunity of obtaining its share of the production of oil or gas from any pool. Accordingly, the AER may issue a declaration of common purchasers of oil and gas under sections 50(1) and 51(1) of the *OGCA*. Historically the AER has not received applications filed under section 50(1) respecting common purchasers of oil, as the prorationing of oil has been handled under other legislation. However the AER has considered many applications under section 51(1) respecting common purchasers of gas and, accordingly, existing practices primarily deal with the common purchasers of gas.

1.2.2 When to Make This Application

A situation that would warrant the filing of a common purchaser application with the AER would be when the gas reserves associated with a well are being drained by other wells producing in the same pool because the owner of the well cannot obtain a reasonable market for its gas or negotiate a share of the existing markets of other owners with producing wells in the same pool. The well owner has recourse to apply for the declaration of a common purchaser in order to recover its share of gas from the pool.

1.2.3 Terms of Application

An order under sections 50(1) and 51(1) of the *OGCA* obliges each common purchaser, among other things, to purchase production offered for sale to it without discrimination in favour of one producer or another in the same pool. Thus, a common purchaser order would allow an owner that has been unable to obtain its own market to share in the markets obtained by other owners in the pool.

Under section 56 of the *OGCA*, an applicant filing a common purchaser application has the option of requesting that the common purchaser order be effective retroactively to the date of the application. The AER considers such a request in light of the particular situation and has the discretion to grant the request, deny it, or provide some measure of retroactivity other than what was requested.

In order to give effect to a common purchaser order, an applicant filing a request for the declaration of a common purchaser of gas under section 51(1) of the *OGCA* also has the option to request under section 51(4)(a) or (b) that the AER direct

- the point at which the common purchaser shall take delivery of gas offered for sale, and
- the proportion of gas that the common purchaser shall purchase from each producer or owner offering gas for sale.

If there is a dispute as to the price to be paid by the common purchaser for the gas, either the common purchaser or an owner may also apply to the Alberta Utilities Commission (AUC) to set the price under section 55(2). An applicant may choose to file an application for the AUC to set the price of the gas at the same time as it files an application with the AER for the declaration of a common purchaser. However, in most cases where the AER is prepared to grant a common purchaser order, the application for setting the price of the gas is likely to be deferred to allow for additional negotiations.

Usually it would not be necessary for an applicant making a request under section 51(1) for the declaration of a common purchaser to also make requests under each of sections 51(4)(a), 51(4)(b), and 56, although each option is available if there is a dispute on each issue. For example, an application for the declaration of a common purchaser under section 51(1) typically also includes requests under section 51(4)(b) for allocation of production among wells in a pool and under section 56 respecting the effective date of an order. Requests made under sections 51 and 56 should be included in the same application.

1.2.4 How the AER Processes the Application

In evaluating an application for a common purchaser order, the AER considers

- whether drainage has occurred subsequent to the completion of a well on the applicant's property and, if so, to what extent,
- whether opportunities have existed for the marketing of production from the applicant's property and, if so, when and the nature of them,
- future prospects for marketing the production, and
- if application is being made under sections 51(4)(a) or 51(4)(b) for the designation of a delivery point or the proportion of production to be purchased if the applicant could not make reasonable arrangements on these matters.

Each application for a common purchaser order will likely proceed to a public hearing.

1.2.5 Requirements for an Application for a Common Purchaser Order (file 12 copies)

Requirements	**Comments**
1) A statement of what you are requesting, including a) the purchasers proposed as the common purchasers, b) the pool to which the common purchaser declaration would apply, and c) the proposed effective date of the order.	For example, Company X applies, pursuant to section 51(1) of the *OGCA*, for an order declaring Company Z as a common purchaser of gas produced from the Woodward Viking A Pool. Company X also requests, pursuant to section 56 of the *OGCA*, that the order be effective as of the date of the application and that, pursuant to section 51(4)(b), the AER direct the proportion of gas that the common purchaser shall purchase from each producer or owner offering gas for sale.
2) A statement of whether you are requesting, pursuant to section 51(4) of the *OGCA*, that the AER, to give effect to the common purchaser declaration, direct a) the point at which the common purchaser shall take delivery of gas offered for sale, and/or b) the proportion of gas that the common purchaser shall purchase from each producer or owner offering gas for sale.	
3) A discussion of the reasons why you are requesting the subject order, including a description of the circumstances that in your opinion have led or will lead to an inequitable situation.	

4) Evidence that your well is completed in the pool to which the common purchaser is to apply, including

    a) a net pay isopach map of the pool, including both oil and gas if there is an associated pool;

    The net pay map should show the entire pool and illustrate wells outside the pool that control the edges of the pool.

    b) where pool delineation or fluid interfaces are based on structural interpretation, a structure contour map of the pool and offsetting area;

    c) an interpreted and annotated log cross-section or representative well log(s) showing

        i) stratigraphic interpretation of the zone(s) of interest,

        ii) interpretation of the fluid interfaces present,

        iii) completions and treatments to the wellbore(s), with dates,

        iv) cumulative production,

        v) finished drilling date and kelly bushing (KB) elevation, and

        vi) the scale of the log readings; and

    If there is a dispute among the parties involved regarding the delineation of the pool(s) in question, you should include an annotated cross-section in the application; if there is no dispute respecting this issue, an annotated representative well log is sufficient.

    d) a tabulation of the interpreted net pay, porosity, and water saturation for each well in the pool, along with the cutoffs, methodology, formulas, and constants used.

    These data allow the AER to assess your mapping and reserves calculations requested in the following item. In addition, these data may be used to allocate production (see item 13).

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5) Data showing that the well is completed and capable of producing at an economic rate

from the pool to which the common purchaser order is to apply.	
6) An evaluation of the oil and gas reserves for the pool and for your lands, including	The reserves estimates confirm that there are reserves available for production.
a) an estimate of the initial oil volume and gas volume in place,	
b) an estimate of the oil and gas recovery factors,	
c) a description of the methods used in determining (a) and (b) above (i.e., material balance, volumetric analysis, model study, a comparison of analog pools), and	
d) the supporting data used in determining (a) and (b) above and the sources of the data (i.e., pressure/volume/temperature [PVT] properties and source, pressure data and source).	You should provide all data used in obtaining the reserves estimates so that your analysis can be duplicated.
7) A discussion of drainage, including	Drainage should be confirmed by summarizing at least two pressure tests obtained from the well.
a) evidence showing that the reserves underlying your lands have been drained subsequent to the completion of your well in the pool,	
b) an estimate of the total amount of drainage that has occurred from your lands since your well was completed in the pool, together with details of how the drainage was calculated, and	
c) estimates of the present and the expected future rate of drainage of your reserves in the absence of the common purchaser	

order, together with the details of how the estimates were obtained.	
8) A discussion of a) the opportunities that have existed for the marketing of gas or oil produced from your property, including documentation showing your attempts to obtain a market for your gas or oil, and b) the future prospects for marketing the gas or oil.	You should have made substantial efforts to obtain your own markets and to negotiate a voluntary sharing of the existing markets of other owners in the pool. You should apply to the AER only as a last resort. You should also continue your efforts to resolve the matter on a voluntary basis after filing the application with the AER.
9) A map showing the areas in the pool from which each purchaser purchases gas or oil and the location of your property.	
10) A statement that the proposed common purchaser purchases, produces, or otherwise acquires gas or oil, as the case may be, from the pool containing your property.	
11) If appropriate, a statement specifying the reasons why all the purchasers in the pool are not being proposed as common purchasers.	
12) If you are requesting, pursuant to section 51(4)(a) of the *OGCA*, that the AER, to give effect to the common purchaser declaration, direct the point at which the common purchaser shall take delivery of gas offered for sale to it,	

a) a discussion and documentation indicating what negotiations were carried out in regard to a delivery point and where the impasse lies,

b) a statement of the proposed delivery point, together with a discussion of the reasons why you propose the location,

c) analyses of the economics of the proposed delivery point and alternate delivery points, and

d) a discussion of the development and probable future development in the area.

For each case, the economic analysis should include a detailed itemization of all costs (excluding sunk costs), forecasts of production and revenue streams, and tabulations of before-tax rate of return, payback, and present value analyses.

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13) If you are requesting, pursuant to section 51(4)(b) of the *OGCA*, that the AER, to give effect to the common purchaser declaration, direct the proportion of the common purchaser's acquisitions of gas from the pool that it shall purchase from each producer or owner offering gas for sale,

a) a discussion and documentation indicating what negotiations were carried out in regard to distributing production among wells in the pool and where the impasse lies, and

b) a discussion of your proposal as to how the AER should distribute production from the pool, including a tabulation of the percentage of total production that each well or group of wells should be allowed to produce, together with details of how the proposed scheme was obtained.

The AER's usual practice is to allocate production among wells in a pool on a percentage basis, rather than setting any specific rate or volume. The proportion of production allocated to each well is commonly based on the following formula:

> Percentage of pool production for specific well = 100 × (wellbore net pay × porosity × gas saturation × area of spacing unit or validated area for specific well) / (sum of wellbore net pay × porosity × gas saturation × area of spacing units or validated areas for all wells)

Directive 032 and *Decision 91-8* offer discussions of the AER's commonly used allocation formula and the validated area concept. The AER has not commonly used mapping as a means to determine hydrocarbon pore volume in a spacing unit because in many cases such mapping is interpretive. The AER has not normally factored the deliverability of a well into an allocation formula to avoid disputes on what constitutes appropriate testing of wells.

You may propose an allocation formula other than the commonly used one; however, you should include detailed justification as to why the AER should deviate from its usual practice in determining an allocation formula.

In some cases it may be useful to set minimum rates, with a percentage allocation above the minimum rate. If a well falls below the minimum rate, other wells are restricted only to their minimum rates and not below.

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14) If you are requesting, pursuant to section 56 of the *OGCA*, that the proposed order be effective prior to the date the order is issued but not prior to the date the application for the order was made to the AER, a discussion as to why the order should be effective on the requested date, including

    a) the steps that you have taken to market your production, and

    b) an indication of whether or not your well is tied into a gathering system and, if not, why the order should be made on a retroactive basis.

1.3 Application for a Common Carrier Order

1.3.1 Background

The *Oil and Gas Conservation Act* (*OGCA*) affords each owner the opportunity of obtaining its share of the production of oil or gas from any pool and provides for economic, orderly, and efficient development in the public interest. Accordingly, the AER may issue a declaration of a common carrier of oil, gas, or synthetic crude oil under section 48 of the *OGCA*.

The common carrier provisions of the *OGCA* cannot be used to gain access to an oil battery, as indicated in the AER letter of October 26, 2005, respecting Application No. 1398650.

1.3.2 When to Make This Application

A typical situation that would warrant the filing of a common carrier application with the AER would be when an owner of a capable well has a market for its gas and has made arrangements to have the gas processed at a nearby plant. Its analysis shows the existing gathering system to be the only economically feasible way, the most practical way to transport the substance in question, or clearly superior environmentally for transporting its gas to the processing plant. However, the owner has been unsuccessful in negotiating an agreement on reasonable terms to use the existing pipeline. The well owner has recourse to apply for the declaration of a common carrier in order to obtain its share of gas from the pool.

1.3.3 Terms of Application

An order under section 48 of the *OGCA* obliges each common carrier, among other things, to transport production without discrimination as between any of the owners for whom transportation is provided. Thus, a common carrier order would allow an owner to share in the existing capacity of the pipeline.

Under section 56 of the *OGCA*, an applicant filing a common carrier application has the option of requesting that the common carrier order be effective retroactively to the date of the application. The AER considers such a request in light of the particular situation and has the discretion to grant the request, deny it, or provide some measure of retroactivity other than what was requested.

In order to give effect to a common carrier order, an applicant filing a request for the declaration of a common carrier under section 48(1) of the *OGCA* also has the option to request that the AER direct

- the point at which the common carrier shall take delivery of the production (section 48(4)(a)), and
- the proportion of production to be taken by the common carrier from each producer or owner offering production to be gathered, transported, handled, or delivered by means of a pipeline (section 48(4)(b)).

If there is a dispute as to the tariff to be paid to the common carrier, either the common carrier or an owner may also apply to the Alberta Utilities Commission (AUC) to set the price under sections 55(1) or 55(3) of the *OGCA*. An applicant may choose to file an application with the AUC to set tariffs at the same time as it files an application under section 48. However, in most cases where the AER is prepared to grant a common carrier order, the application for the setting of tariffs may be deferred to allow for additional negotiations.

Usually it would not be necessary for an applicant making a request under section 48(1) of the *OGCA* for the declaration of a common carrier to also make requests under each of sections 48(4)(a), 48(4)(b) and 56, although each option is available if there is a dispute on each issue. For example, an application for the declaration of a common carrier under section 48(1) typically also includes requests under section 48(4)(b) for allocation of production among wells in a pool and under section 56 respecting the effective date of an order. Requests under sections 48 and 56 should be included in the same application.

1.3.4 How the AER Processes the Application

In evaluating an application for a common carrier order, the AER considers whether the applicant has demonstrated that

- producible reserves are available for transportation through an existing pipeline,
- there is a reasonable expectation of a market for the substance that is proposed to be transported by the common carrier operation,
- the applicant could not make reasonable arrangements to use the existing pipeline,
- the proposed common carrier operation is the only economically feasible way, the most practical way to transport the substance in question, or clearly superior environmentally, and
- where application is being made under sections 48(4)(a) or 48(4)(b) of the *OGCA* for the designation of a delivery point or the proportion of production to be delivered to the pipeline the applicant could not make reasonable arrangements on these matters.

Each common carrier application will likely proceed to a public hearing.

1.3.5 Requirements for an Application for a Common Carrier Order (file 12 copies)

Requirements	**Comments**
1) A statement of what is being requested, including a) a reference that you are making the application under section 48 of the *OGCA*, b) the name of the company to be designated as the common carrier, c) reference to the pool or pools to which the proposed common carrier declaration would apply, or if it is proposed that the order not apply to any specific pool, a discussion as to why the order should not apply to a specific pool or pools, d) the location of the pipeline(s) to which the proposed common carrier order would apply, including the proposed tie-in and terminating points, and e) the proposed effective date of the order.	For example, Company X applies under section 48 of the *OGCA* for an order declaring Company Z to be a common carrier of gas produced from the Woodward Viking A Pool through a pipeline extending from LSD x to LSD y and including a field compressor located in LSD z. Company X also requests, pursuant to section 56 of the *OGCA*, that the order be effective as of the date of the application and that, pursuant to section 48(4)(b) of the *OGCA*, the AER direct the proportion of production to be taken by the common carrier from each producer or owner.
2) A statement of whether you are requesting, pursuant to section 48(4) of the *OGCA*, that the AER, to give effect to the common carrier declaration, direct a) the point at which the common carrier shall take delivery of production, and/or b) the proportion of production to be taken by the common carrier from each producer or owner.	See comments for items 13, 14, and 16.

3) A discussion giving the reasons why you are requesting the subject order, including a description of the circumstances that in your opinion have led or will lead to an inequitable situation.	
4) Documentation showing that reasonable arrangements for the use of the pipeline could not be agreed upon, including a) identification of all parties involved and the nature of their issues and concerns, and	You should have made substantial efforts to negotiate a resolution to the matter prior to filing an application with the AER. The application should be a last resort. You should also continue your efforts to resolve the matter on a voluntary basis (including consideration of a third-party mediator) after filing the application with the AER.
b) an outline of the attempts to resolve the issues, including type of discussions held, timing, and frequency.	Your discussion must include the reasons why the negotiations did not lead to a settlement and what dispute resolution efforts were conducted. Matters of confidentiality and disclosure should be addressed and determined by the parties prior to submission of the application. The documentation should illustrate your case that you have been unable to obtain reasonable arrangements. Matters of dispute may include access on terms that would allow you to obtain your share of production from the pool at reasonable fees.
5) A statement specifying the operator and ownership of the pipeline to be subject to the proposed order.	
6) An indication of the available capacity of the pipeline to be subject to the proposed common carrier order.	

7) A map showing the location of the subject pool, pipeline(s), any alternative facilities, and your production facilities.

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8) Your geological interpretation of the pool involved, including

   a) a net pay isopach map of the pool, including both oil and gas if there is an associated pool;

   The net pay map should show the entire pool and illustrate wells outside the pool that define the edges of the pool.

   b) where pool delineation or fluid interfaces are based on structural interpretation, a structure contour map of the pool and offsetting area;

   c) an interpreted and annotated log cross-section or representative well log(s) showing

      i) stratigraphic interpretation of the zone(s) of interest,

      ii) interpretation of the fluid interfaces present,

      iii) completions and treatments to the wellbore(s), with dates,

      iv) cumulative production,

      v) finished drilling date and kelly bushing (KB) elevation, and

      vi) the scale of the log readings; and

   If there is a dispute among the parties involved regarding the delineation of the pool(s) in question, you should include an annotated cross-section in the application; where there is no dispute respecting this issue, an annotated representative well log is sufficient.

   d) a tabulation of the interpreted net pay, porosity, and water saturation for each well in the pool, along with the cutoffs, methodology, formulas, and constants used.

   These data assist the AER to assess your mapping and reserves calculations requested in the following item. In addition, these data may be used to allocate production (see item 14).

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9) An evaluation of the oil and gas reserves for the pool and for your lands, including a) an estimate of the initial oil volume and gas volume in place, b) an estimate of the oil and gas recovery factors, c) a description of the methods used in determining (a) and (b) above (e.g., material balance, volumetric analysis, model study, a comparison of analog pools), and d) the supporting data used in determining (a) and (b) above and the sources of the data (i.e., pressure/volume/temperature [PVT] properties and source, pressure data and source).	The reserves estimates confirm that there are reserves available for production. You should provide all data used in obtaining the reserves estimates so that your analysis can be duplicated.
10) A discussion of drainage, including a) evidence showing that the reserves underlying your lands have been drained subsequent to the completion of your well in the pool, and b) an estimate of the total amount of inequitable drainage that has occurred from your lands since your well was completed in the pool, together with details of how the drainage was calculated.	Drainage is not a prerequisite for the issuance of a common carrier order but could be one factor in determining the need for an order. In addition, the AER would consider the extent to which drainage has occurred in evaluating what the effective date of the order should be. In cases where a well has remained shut in, you may confirm drainage by summarizing a minimum of two pressure tests taken on the well. If you are arguing that your currently producing well is not producing at sufficient rates to recover an equitable share of production, you may make a comparison between the actual produced volume from the well and the volume the well should have produced to obtain an equitable share of production. You should present a detailed calculation showing how you determined your equitable share of production.

11) A discussion of the practicability, economics, and any environmental concerns of a) the proposed common carrier operation, b) the alternative of building new facilities, c) the alternative of using other facilities (such as taking the gas to another existing plant), and d) any other alternatives available.	For each case, the economic analysis should include a detailed itemization of all costs used (excluding sunk costs), forecasts of production and revenue streams, and tabulations of before-tax rate of return, payback, and present value analyses.
12) A discussion of the availability or the reasonable expectation of a market for the oil, gas, or synthetic crude oil that would be transported in the common carrier operation.	
13) If you are requesting, pursuant to section 48(4)(a) of the *OGCA*, that the AER, to give effect to the common carrier declaration, direct the point at which the common carrier shall take delivery of any production to be gathered, transported, handled, or delivered by means of the subject pipeline, a) a discussion and documentation indicating what negotiations were carried out in regard to a delivery point and where the impasse lies, b) a statement of the proposed delivery point, together with a discussion of the reasons why you propose the location,	
c) analyses of the economics of the proposed delivery point and alternative delivery points, and	For each case, the economic analysis should include a detailed itemization of all costs (excluding sunk costs), forecasts of production

	and revenue streams, and tabulations of before-tax rate of return, payback, and present value analyses.
d) a discussion of the development and probable future development in the area.	
14) If you are requesting, pursuant to section 48(4)(b) of the *OGCA*, that the AER, to give effect to the common carrier declaration, direct the proportion of production to be taken by the common carrier from each producer or owner offering production to be gathered, transported, handled, or delivered by means of the subject pipeline, a) a discussion and documentation indicating what negotiations were carried out in regard to distributing production among wells in the pool and where the impasse lies, and b) a discussion of your proposal as to how the AER should distribute production from the pool that includes a tabulation of the proportion or percentage of total production that each well or group of wells should be allowed to produce, together with the details of how the proposed production scheme was obtained.	The AER's usual practice is to allocate production among wells in a pool on a percentage basis, rather than setting any specific rate or volume. The proportion of production allocated to each well is commonly based on the following formula: Percentage of pool production for specific well = 100 × (wellbore net pay × porosity × gas saturation × area of spacing unit or validated area for specific well) / (sum of wellbore net pay × porosity × gas saturation × area of spacing units or validated areas for all wells) *Directive 032* and *Decision 91-8* offer discussions on the AER's commonly used allocation formula and the validated area concept. The AER has not generally used mapping as a means to determine hydrocarbon pore volume in a spacing unit because in many cases such mapping is highly interpretive. The AER has not normally factored the deliverability of a well into an allocation formula to avoid disputes on what constitutes appropriate testing of wells. You may propose an allocation formula other than the commonly used one; however, you should offer detailed justification as to why the AER should deviate from its consistent practice in determining an allocation formula.

In some cases it may be useful to set minimum rates, with a percentage allocation above the minimum rate. If a well falls below the minimum rate, other wells are restricted only to their minimum rates and not below.

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15) If you are requesting, pursuant to section 56 of the *OGCA*, that the proposed order be effective prior to the date the order is issued but not prior to the date the application for the order was made to the AER, a discussion as to why the order should be effective on the requested date, including

    a) the steps that you have taken to market your production, and

    b) an indication of whether your well is tied into a gathering system and, if not, why the order should be made on a retroactive basis.

1.4 Application for a Common Processor Order

1.4.1 Background

The *Oil and Gas Conservation Act* (*OGCA*) affords each owner the opportunity of obtaining its share of the production of oil or gas from any pool and provides for economic, orderly, and efficient development in the public interest. Accordingly, the AER may issue a declaration of a common processor of gas under section 53 of the *OGCA*.

1.4.2 When to Make This Application

A typical situation that would warrant the filing of a common processor application with the AER would be when an owner of a capable well has a market for its gas requiring processing to meet contract specifications. The owner believes that using the existing plant is the only economically feasible or most practical way to process the gas in question or is clearly superior environmentally, but the owner has been unsuccessful in negotiations to gain access to the plant on reasonable terms. The owner has recourse to apply for the declaration of a common processor in order to gain access to the plant and allow it to obtain its share of gas from the pool.

1.4.3 Terms of Application

An order under this section obliges each common processor, among other things, to process gas that may be made available for processing in the plant without discrimination in favour of one producer or owner as against another in the pool.

Under section 56 of the *OGCA*, an applicant filing a common processor application has the option of requesting that the common processor order be effective retroactively to the date of the application. The AER considers such a request in light of the particular situation and has the discretion to grant the request, deny it, or provide some measure of retroactivity other than that requested.

In order to give effect to a common processor order, an applicant filing a request for the declaration of a common processor also has the option of requesting that the AER direct

- the proportion of production to be processed by the common processor from each producer or owner in the pool (section 53[5][a]), and/or
- the total amount of gas to be processed by the common processor from the pool subject to the common processor declaration (section 53[5][b]).

If there is a dispute as to the tariff to be paid to the common processor, either the common processor or an owner may also apply under section 55(2) of the *OGCA* to the Alberta Utilities Commission (AUC) to set the price.

An applicant may choose to file an application with the AUC to set fees at the same time as it files an application under section 53. However, in most cases where the AER is prepared to grant a common processor order, the application for the setting of tariffs may be deferred to allow for additional negotiations.

Usually it would not be necessary for an applicant making a request under section 53(1) for the declaration of a common processor to also make requests under each of sections 53(5)(a), 55(2), and 56, although each option is available if there is a dispute on each issue. For example, an application for the declaration of a common processor under section 53(1) typically also includes requests under section 53(5)(a) for allocation of production among wells in a pool and under section 56 respecting the effective date of an order. Requests under sections 53 and 56 should be included in the same application.

1.4.4 How the AER Processes the Application

In evaluating an application for a common processor order, the AER considers whether the applicant has demonstrated that

- producible reserves are available for processing and processing facilities are needed,
- reasonable arrangements for use of processing capacity in the subject processing plant could not be agreed upon by the parties,
- the proposed common processor operation is either the only economically feasible or most practical way to process the gas in question or is clearly superior environmentally, and
- when an application is being made under sections 53(5)(a) or 53(5)(b) of the *OGCA* for the allocation of production or a direction of the total volume of gas from the pool to be processed at the plant the applicant could not make reasonable arrangements on these matters.

Each application for a common processor order will likely proceed to a public hearing.

1.4.5 Requirements for an Application for a Common Processor Order (file 12 copies)

Requirements	**Comments**
1) A statement of what is being requested, including a) a reference that you are making the application under section 53 of the *OGCA*, b) the name of the company to be designated as the common processor, c) a reference to the pool or pools to which the proposed common processor declaration would apply, d) the name and the location of the processing plant to which the proposed common processor order would apply, and e) the proposed effective date of the order.	For example, Company X applies under section 53 of the *OGCA* for an order declaring Company Z to be a common processor of gas produced from the Woodward Viking A Pool through the Grande Coulee Gas Plant located at LSD. Company X also requests, pursuant to section 56 of the *OGCA*, that the order be effective as of the date of the application and that, pursuant to section 53(5)(a) of the *OGCA*, the AER direct the proportion of production to be taken by the common processor from each producer or owner in the Woodward Viking A Pool.
2) A statement of whether you are requesting, pursuant to section 53(5) of the *OGCA*, that the AER, in order to give effect to the common processor declaration, direct a) the proportion of production to be processed by the common processor from each producer or owner in the pool or pools, and/or b) the total amount of gas to be processed by the common processor from the pool or pools subject to the common processor declaration.	See comments for items 14, 15, and 17.

3) A discussion giving the reasons why you are requesting the order, including a description of the circumstances that in your opinion have led or will lead to an inequitable situation.

4) Documentation showing that reasonable arrangements for the use of processing capacity in the plant could not be agreed upon, including

   a) identification of all parties involved and the nature of their issues and concerns, and

   b) an outline of the attempts to resolve the issues, including type of discussions held, timing, and frequency.

You should have made substantial efforts to negotiate a resolution to the matter prior to filing an application with the AER. The application should be a last resort. You should also continue your efforts to resolve the matter on a voluntary basis (including consideration of a third-party mediator) after you have filed the application with the AER.

Your discussion must include the reasons why the negotiations did not lead to a settlement and what dispute resolution efforts were conducted. Matters of confidentiality and disclosure should be addressed and determined by the parties prior to submission of the application.

The documentation should illustrate your case that you have been unable to obtain reasonable arrangements. Matters of dispute may include access on terms that would allow you to obtain your show or production from the pool at reasonable tariffs.

5) A map showing the location of the subject pool, processing plant, any alternative facilities, and your production facilities.

6) A statement specifying the operator and ownership of the processing plant.

7) A discussion of

   a) the total processing capacity of the plant,

   b) the volumes of gas from the pool or pools to be subject to the proposed common processor declaration and from other pools currently processed at the subject plant, and

   c) the processing capacity available to you in the plant.

8) An analysis of the composition of the gas to be processed under the common processor declaration, together with a discussion as to the capability of the plant to process the subject gas.

9) Your geological interpretation of the pool involved, including

   a) a net pay isopach map of the pool, including both oil and gas if there is an associated pool;

The net pay map should show the entire pool and illustrate wells outside the pool that control the edges of the pool.

   b) where pool delineation or fluid interfaces are based on structural interpretation, a structure contour map of the pool and offsetting area;

   c) an interpreted and annotated log cross-section or representative well log(s) showing

      i) stratigraphic interpretation of the zone(s) of interest,

      ii) interpretation of the fluid interfaces present,

If there is a dispute among the parties involved regarding the delineation of the pool(s) in question, you should include an annotated cross-section in the application; if there is no dispute respecting this issue, an annotated representative well log is sufficient.

        iii) completions and treatments to the wellbore(s), with dates,

        iv) cumulative production,

        v) finished drilling date and kelly bushing (KB) elevation, and

        vi) the scale of the log readings; and

    d) a tabulation of the interpreted net pay, porosity, and water saturation for each well in the pool, along with the cutoffs, methodology, formulas, and constants used.

These data assist the AER to assess your mapping and reserves calculations requested in the following item. In addition, the data may be used to allocate production (see item 14).

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10) An evaluation of the oil and gas reserves for the pool and for your lands, including

The reserve estimates confirm that there are reserves available for production.

    a) an estimate of the initial oil volume and gas volume in place,

    b) an estimate of the oil and gas recovery factors,

    c) a description of the methods used in determining (a) and (b) above (e.g., material balance, volumetric analysis, model study, a comparison of analog pools), and

    d) the supporting data used in determining (a) and (b) above and the sources of the data (e.g., pressure/volume/temperature [PVT] properties and source, pressure data and source).

You should provide all data used in obtaining the reserves estimates so that your analysis can be duplicated.

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11) A discussion of drainage, including a) evidence showing that the reserves underlying your lands have been drained subsequent to the completion of your well in the pool, and b) an estimate of the total amount of inequitable drainage that has occurred from your lands since your well was completed in the pool, together with details of how the drainage was calculated.	Drainage is not a prerequisite for the issuance of a common processor order but could be one factor in determining the need for an order. In addition, the AER considers the extent to which drainage has occurred in evaluating what the effective date of the order should be. In cases where a well has remained shut in, you can confirm drainage by summarizing a minimum of two pressure tests taken on the well. If you are arguing that your currently producing well is not producing at sufficient rates to recover an equitable share of production, you may make a comparison between the actual produced volume from the well and the volume the well should have produced to obtain an equitable share of production. You should present a detailed calculation showing how you determined your equitable share of production.
12) A discussion of the practicability, economics, and any environmental concerns of a) the proposed common processor operation, b) the alternative of building new facilities, c) the alternative of using other facilities (such as taking the gas to another existing plant), and d) any other alternatives available.	For each case, the economic analysis should include a detailed itemization of all costs (excluding sunk costs), forecasts of production and revenue streams, and tabulations of before-tax rate of return, payback, and present value analyses.
13) A discussion of the availability or the reasonable expectation of a market for your gas that would be processed at the plant.	

14) If you are requesting, pursuant to section 53(5)(a) of the *OGCA*, that the AER, in order to give effect to the common processor declaration, direct the proportion of production to be processed by the common processor from each producer or owner in the pool or pools,

  a) a discussion and documentation indicating what negotiations were carried out in regard to distributing production among wells in the pool and where the impasse lies, and

  b) a discussion of your proposal as to how the AER should distribute production from the pool, including a tabulation of the proportion or percentage of total production that each well or group of wells should be allowed to produce, together with the details of how the proposed production scheme was obtained.

The AER's usual practice is to allocate production among wells in a pool on a percentage basis, rather than setting any specific rate or volume. The proportion of production allocated to each well is commonly based on the following formula:

> Percentage of pool production for specific well = 100 × (wellbore net pay × porosity × gas saturation × area of spacing unit or validated area for specific well) / (sum of wellbore net pay × porosity × gas saturation × area of spacing units or validated areas for all wells)

Directive 032 and *Decision 91-8* offer discussions of the AER's commonly used allocation formula and the validated area concept. The AER has not generally used mapping as a means to determine hydrocarbon pore volume in a spacing unit because in many cases such mapping is highly interpretive. The AER has not normally factored the deliverability of a well into an allocation formula to avoid disputes on what constitutes appropriate testing of wells. You may propose an allocation formula other than the commonly used one; however, you should offer detailed justification as to why the AER should deviate from its consistent practice in determining an allocation formula.

In some cases it may be useful to set minimum rates, with a percentage allocation above the minimum rate. If a well falls below the minimum rate, other wells are restricted only to their minimum rates and not below.

15) If you are requesting, pursuant to section 53(5)(b) of the *OGCA*, that the AER, in order to give effect to the common processor declaration, direct the total amount of gas to be processed by the common processor from the pool or pools subject to the common processor declaration,

   a) a statement of why you believe such a total volume should be set,

   b) a discussion and documentation indicating what negotiations were carried out in regard to the total amount of gas to be processed by the common processor from the pool or pools subject to the common processor declaration and where the impasse lies, and

   c) a statement of the total amount of gas you propose be processed by the common processor from the pool or pools subject to the common processor, together with a discussion of how the volume was determined.

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16) If you are requesting, pursuant to section 56 of the *OGCA*, that the proposed order be effective prior to the date the order is issued but not prior to the date the application for the order was made to the AER, a discussion as to why the order should be effective on the requested date, including

   a) the steps that you have taken to market your production, and

b) an indication of whether your well is tied into a gathering system and, if not, why the order should be made on a retroactive basis.

1.5 Application for a Compulsory Pooling Order

1.5.1 Background

Section 4.021 of the *Oil and Gas Conservation Rules* specifies that no well shall be produced unless there is common ownership throughout the drilling spacing unit (DSU). This means that if there are separate tracts within a DSU with different ownership, all owners within the DSU must have an arrangement to share in the costs and revenues associated with drilling and producing a well from that spacing unit. This type of arrangement is generally referred to as a pooling agreement. In most cases, mineral holders negotiate voluntary pooling arrangements. However, if an owner attempts but fails to negotiate a satisfactory pooling arrangement in a reasonable period of time, or a tract owner is missing and untraceable, or there is a dispute as to the ownership of a tract, the owner wishing to drill a well may apply to the AER for a compulsory pooling order. This order serves the same purpose as a voluntary pooling arrangement by ensuring that each owner in the DSU shares appropriately in the costs and revenues associated with a well in the DSU.

The AER's role in pooling matters, therefore, is to offer a regulatory avenue to resolve problems relating to pooling issues, thereby allowing each owner the opportunity to obtain its share of oil and gas from any pool.

Applications for compulsory pooling are made

- under section 80 of the *Oil and Gas Conservation Act* (*OGCA*);
- if there is a missing and untraceable owner in the spacing unit, under both sections 80 and 85 of the *OGCA* (section 85 provides that the revenues associated with the missing and untraceable owner be paid to the Public Trustee); and
- if there is a dispute as to the ownership of a tract or ownership is unknown, under both sections 80 and 86 of the *OGCA* (section 86 provides that revenues associated with the disputed tract be paid to the Provincial Treasurer to be held in trust pending an order of the Court of Queen's Bench or until a settlement has been reached by the parties).

The AER's current policies and practices respecting pooling arise from a combination of specific provisions of the *OGCA*, historical decisions made by the AER, consultations with industry, and AER decisions resulting from pooling applications considered at public hearings. These avenues have resulted in an AER pooling order with standard terms. Nonstandard terms are included in an order only if there is substantial justification to do so. General information on major AER policies and practices respecting pooling and the standard terms of a pooling order are noted below in the Requirements sections. More detailed information can be obtained from AER staff.

1.5.2 How the AER Processes the Application

AER staff initially review a pooling application for completeness. If additional information is required, a letter is issued itemizing the information required. Processing of the application is deferred pending receipt of the requested information.

Except in cases involving missing and untraceable owners or minor amendments to existing pooling orders, once an application is complete the AER normally issues a notice of application. The notice of application would not usually be published in any newspapers but would be sent directly to parties with an interest in the petroleum and/or natural gas underlying the DSU. Interested parties would have a specified time period in which to file any submissions they may have respecting the application.

If no submissions are received in response to the notice of application, the AER makes a decision on the application without further notice or a hearing. If a submission is filed in response to the notice of hearing, the scheduled hearing will likely proceed and the AER will consider the application and the filed submissions.

1.5.3 Requirements for an Application for a Compulsory Pooling Order (file 12 copies)

Requirements

Comments

1) A statement of what you are requesting, including
    a) a reference to the section(s) of the *OGCA* under which you are making the application, and
    b) the legal description of the DSU involved.

You should cite section 80 of the *OGCA* and, if applicable, sections 85 or 86. For example: Company X is applying for a compulsory pooling order for the production of gas under section 80 of the *OGCA* in the DSU constituting Section 13-45-12W4M.

The size of the DSU involved should be consistent with the substance to be pooled (oil or gas). Thus, oil would normally be pooled within a standard oil DSU of a quarter section, while gas would be pooled within a standard gas DSU of one section.

Compulsory pooling occurs only within a single DSU. Section 80 of the *OGCA* does not allow for compulsory pooling within several DSUs.

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2) A statement providing the legal description of each tract within the DSU and the ownership of that tract, together with a table showing the mailing addresses for all lessors and lessees (except the Crown).

For example, for the gas DSU constituting Section 13-45-12W4M:

	Ownership		
Tract	**Lessor**		**Lessee**
SW quarter	Crown		Company A
SE quarter	Freehold	1/2 undivided I. Doe	Company A
		1/2 undivided P. Doe	Not leased
North half	Freehold	Company B	Company A

You should provide the mailing addresses of all lessors (except the Crown) and lessees as an attachment to the application. This allows the AER to provide notice of the application to all potentially adversely affected parties.

3) A statement of the formation to which you propose to drill or from which you propose to produce.	The formation subject to the pooling order would be cited in the order. In previous pooling applications where there has been a dispute about which formations should be subject to a pooling order, the AER decided to limit the formation subject to the order to the known productive zone or to the major productive zone (*Examiner Reports 91-6* and *95-2*).
4) A statement that an agreement to operate the tracts as a unit cannot be made on reasonable terms.	
5) The particulars of the efforts you have made to obtain a voluntary agreement, including a) identification of all parties involved and the nature of their issues and concerns, b) an outline of the attempts to resolve the issues, including type of discussions held, timing, and facilities, and c) an indication of your view of why attempts to obtain a voluntary pooling arrangement have failed in each case.	You should have made substantial efforts to negotiate a voluntary pooling arrangement. The application should be a last resort. You should also continue your efforts to resolve the matter on a voluntary basis (including considerations of a third-party mediator) after filing the application with the AER. Your discussion must include the reasons why the negotiations did not lead to a settlement and what dispute resolution efforts were conducted. Matters of confidentiality and disclosure should be addressed and determined by the parties prior to submission of the application. A description of your efforts to resolve the situation should include a summary of telephone calls and meetings and copies of relevant correspondence.
6) If there is a well on the DSU that is to be produced under the proposed pooling order, a statement of the unique identifier of the well and its producing formation or formations.	The well to be subject to the pooling order would be cited in the pooling order.

7) If there is not a well on the DSU drilled to the formation(s) referred to in item 3, a statement indicating the location (LSD) of the well to be drilled.	The proposed well location would be included in the pooling order.
8) If there is not a well on the DSU drilled to the formation(s) referred to in item 3, a statement that if an order is made by the AER, you are prepared to drill a well to the formation(s) in question, and in the event that no production of gas or oil is obtained, you will pay all costs incurred in the drilling and abandonment of the well in accordance with section 80(2)(f) of the *OGCA*.	
9) If there is not a well drilled on the DSU, an indication of whether you would see any difficulty in drilling the well within six months of the date of the proposed order if issued, and if so, an indication of what would be a more appropriate time limit to drill.	Section 82(2) of the *OGCA* implies that a well should be drilled within six months of the date of the order.
10) A statement of the operator to be appointed for the well of interest in the proposed pooling order.	All pooling orders normally include a clause that names the operator of the well subject to the pooling order.
11) A statement that the allocation of costs and revenues under the pooling order would be on a tract area basis, or if allocation is proposed to be on a basis other than an area basis, the proposed allocation and the details of how the allocation was determined, including	Section 80(4)(c) of the *OGCA* indicates that allocation shall be on an area basis unless it can be shown to the AER that this is inequitable. Thus, allocation on an area basis is the normal provision of a pooling order, and an applicant would not need to justify why it has chosen to request an area-based allocation.

a) a net pay isopach map of the pool, including both oil and gas if there is an associated pool;

b) if pool delineation or fluid interfaces are based on structural interpretation, a structure contour map of the pool and offsetting area;

c) an interpreted and annotated log cross-section or representative well log(s) showing

   i) stratigraphic interpretation of the zone(s) of interest,

   ii) interpretation of the fluid interfaces present,

   iii) completions and treatments to the wellbore(s), with dates,

   iv) cumulative production,

   v) finished drilling date and kelly bushing (KB) elevation, and

   vi) the scale of the log readings, and

d) a tabulation of the interpreted net pay, porosity, and water saturation for each well in the pool, along with the cutoffs, methodology, formulas, and constants used.

If there is a dispute among the parties involved regarding the delineation of the pool(s) in question, you should include an annotated cross-section in the application; if there is no dispute respecting this issue, an annotated representative well log is sufficient.

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12) A statement indicating whether you are proposing that the requested order provide for the equalization of the actual cost of drilling the well to and completing it in the formation(s) named in the pooling order, in accordance with section 80(4)(d) of the *OGCA*.

This is a standard provision of a typical pooling order. It applies to a situation where an applicant has itself drilled a well for the purpose of producing the zone to be subject to the pooling order or is proposing to drill such a well.

	If the case is not the standard one—for example, if a well was drilled and produced from a zone other than the one to be subject to the pooling order—it would normally be appropriate to modify the standard provision such that not all original drilling and completion costs would be shared.
13) A statement as to whether you are proposing that the requested order provide for a penalty to be imposed against actual drilling and completion costs in accordance with section 80(5) of the *OGCA* and, if so, a) what penalty should be imposed, b) the justification for the proposed penalty, and c) confirmation that in accordance with normal AER practice, you would agree that the proposed penalty would be applied if the tract owner did not pay its share of actual drilling and completion costs within 30 days of the pooling order being issued, the well commencing production, and the tract owner being notified in writing of its share of costs, whichever is later; or if you are proposing an alternative to the AER's normal practice, a justification of why the AER should depart from its normal practice in this case.	A penalty under section 80(5) of the *OGCA* is a standard provision of pooling orders involving disputes between industry players. In these cases, the AER has normally provided for the maximum penalty allowed by section 80(5). That is, if the maximum penalty applies and a tract owner has chosen to incur the penalty rather than pay costs "up front," the tract owner would owe the well operator its share costs plus the penalty of two times the cost. If the tract owner's share of costs were $10 000 and it chose to incur the penalty, it would pay costs of $10 000 plus two times the costs, equalling $20 000, for a total of $30 000.

1.6 Special Drilling Spacing Unit

[Rescinded]

Unit 2 Conservation

2.1 Application for an Enhanced Recovery Scheme

2.1.1 Introduction

2.1.1.1 Background

Enhanced recovery (ER) improves hydrocarbon recovery by injecting fluid(s) into a hydrocarbon reservoir to

- add to or maintain reservoir energy (pressure),
- displace hydrocarbons to production wells, and/or
- alter the reservoir fluids so that hydrocarbon flow and recovery are improved.

An application to implement or amend an ER scheme is required in accordance with section 39(1)(a) of the *Oil and Gas Conservation Act* (*OGCA*). Additional approvals from the AER or other government agencies may also be required to implement an ER scheme.

If changes to an existing ER scheme approval are required, an application must be made for the appropriate amendments.

2.1.1.2 Application Process

A) How to Make an ER Scheme Application

An ER scheme application must be made using the enhanced recovery scheme application form (see appendix F). This form, along with schedule 1 and the required attachments, must be included in the application. This information should be submitted electronically using the Electronic Application Submission (EAS) process accessed through the Digital Data Submission (DDS) screen on the AER's website, www.aer.ca. The AER will validate all applications to ensure that the requirements for ER schemes have been met. Incomplete applications or those containing significant errors will be closed.

This application process does not apply to crude bitumen ER schemes in the oil sands areas. An application for these schemes must comply with the *Oil Sands Conservation Act* (section 10 for new schemes, or section 13 for an amendment to an existing scheme).

The AER will permit, without application, a maximum cumulative water injection of 500 m^3 in order to acquire the information required under *Directive 051: Injection and Disposal Wells – Well Classifications, Completions, Logging, and Testing Requirements* and to determine the maximum wellhead injection pressure (MWHIP).

B) How the AER Processes the Application

The AER reviews all ER scheme applications to ensure that hydrocarbon recovery will be optimized and that all ER scheme requirements are met. ER scheme applications meeting the base criteria detailed in figure 2.1 will be processed in an expedited manner under a quick ER application process.

Applications qualifying for the quick process will be processed in a way that shifts the review emphasis from scheme design (application) to scheme performance (audit). Applications not meeting these base criteria will require a more detailed review addressing those areas in which the criteria are not met.

The AER will issue its disposition of ER scheme applications electronically, with the disposition being available for viewing through IAR Query for 30 days after the disposition of the application. IAR Query is accessible via the Systems and Tools portal on the AER's website.

Except for cases in which Class IIIa (acid gas) and IIIb (CO_2) fluids, as described in *Directive 051*, are injected in an ER scheme, the *Directive 051* application associated with a proposed injector can be submitted at any time before or after the *Directive 065* ER scheme application is submitted. *Directive 051* applications associated with Class IIIa and IIIb ER schemes must be submitted at the same time as the *Directive 065* application.

The *Directive 065* and *Directive 051* applications must be submitted through the DDS system.

All injection wells must meet the initial and subsequent *Directive 051* requirements.

If ER operations involve any hydrogen sulphide (H_2S) injection and an emergency response plan (ERP) is required, the ERP must be approved before the ER scheme approval is issued. ERPs are approved and reviewed for compliance by the AER Emergency Management Group. See *Directive 071: Emergency Preparedness and Response Requirements for the Upstream Petroleum Industry* for further details on emergency response planning. Also, if an injection fluid contains H_2S, all pipelines and facilities associated with the scheme must be approved for the appropriate sour service as directed by *Directive 056: Energy Development Applications and Schedules*.

Pool delineation differences that are pertinent to the ER scheme design must be resolved by a separate pool delineation application, in accordance with section 2.5 of this directive, before submitting an ER scheme application. An exception may be if the proposed approval area is larger than the pool order boundary due to wells not yet evaluated by the AER.

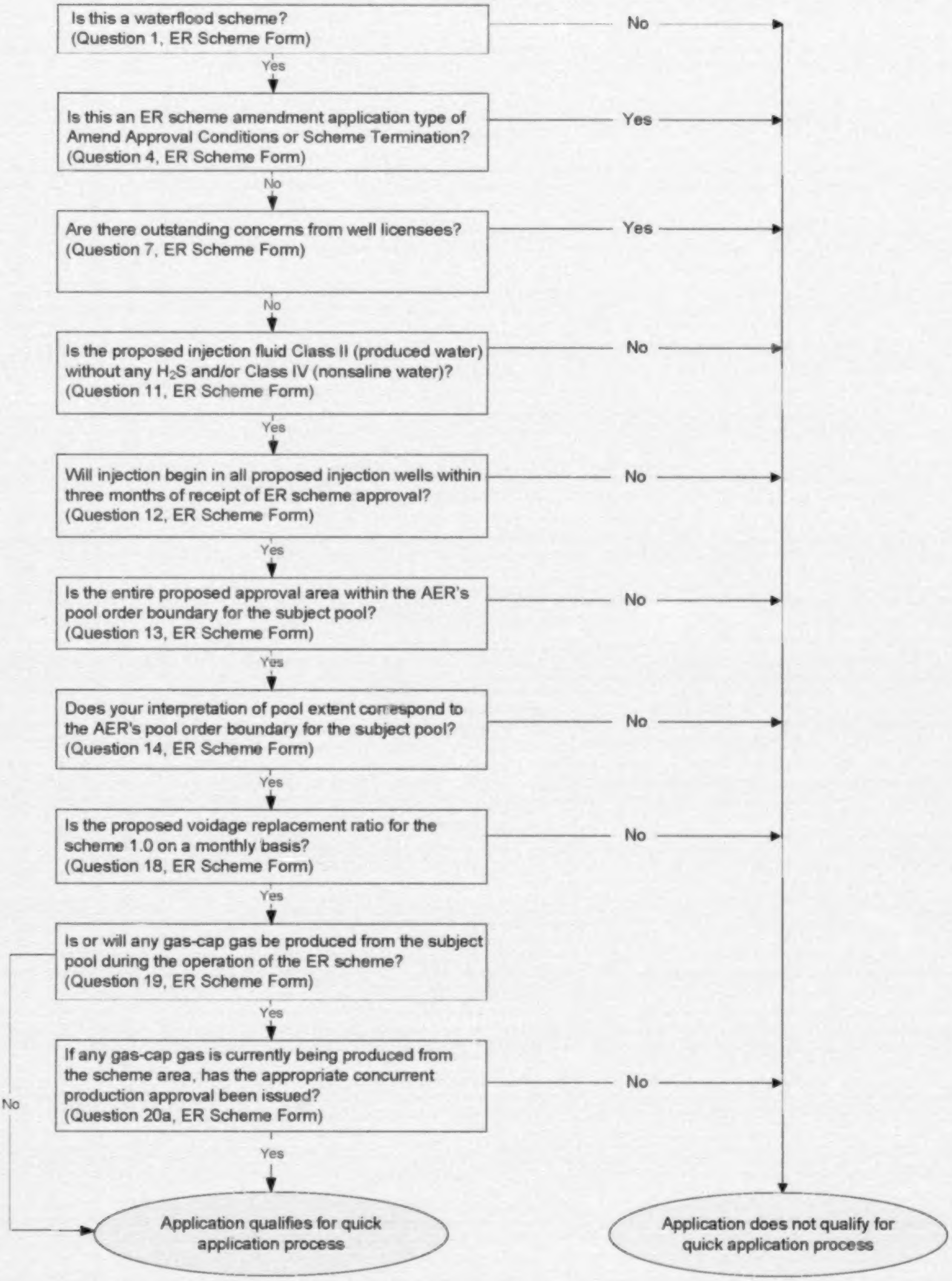
Is this a waterflood scheme?
(Question 1, ER Scheme Form)
No
Yes
Is this an ER scheme amendment application type of Amend Approval Conditions or Scheme Termination?
(Question 4, ER Scheme Form)
Yes
No
Are there outstanding concerns from well licensees?
(Question 7, ER Scheme Form)
Yes
No
Is the proposed injection fluid Class II (produced water) without any H2S and/or Class IV (nonsaline water)?
(Question 11, ER Scheme Form)
No
Yes
Will injection begin in all proposed injection wells within three months of receipt of ER scheme approval?
(Question 12, ER Scheme Form)
No
Yes
Is the entire proposed approval area within the AER's pool order boundary for the subject pool?
(Question 13, ER Scheme Form)
No
Yes
Does your interpretation of pool extent correspond to the AER's pool order boundary for the subject pool?
(Question 14, ER Scheme Form)
No
Yes
Is the proposed voidage replacement ratio for the scheme 1.0 on a monthly basis?
(Question 18, ER Scheme Form)
No
Yes
Is or will any gas-cap gas be produced from the subject pool during the operation of the ER scheme?
(Question 19, ER Scheme Form)
Yes
No
If any gas-cap gas is currently being produced from the scheme area, has the appropriate concurrent production approval been issued?
(Question 20a, ER Scheme Form)
No
Yes
Application qualifies for quick application process
Application does not qualify for quick application process

Figure 2.1 Decision tree for the quick enhanced recovery application process

2.1.1.3 Other Issues

A) Allowable Administration

For oil pools on maximum rate limitation (MRL) administration, upon approval of a new ER scheme or ER scheme amendment, good production practice (GPP) will normally be granted to the wells within the approval area. If injection is not scheduled to begin within three months of the scheme approval, the AER may decide to grant GPP after written notification to the AER that injection has commenced. Wells outside of the approval area will normally remain on MRL.

If granted with the condition that injection will begin within three months, GPP will be effective concurrent with the ER scheme approval. Wells must not produce above their MRL before GPP is granted. With the granting of GPP before confirmation that injection has commenced, the AER expects operators to prudently produce their wells pending the successful implementation of ER.

For oil pools on GPP administration, upon approval of a new ER scheme or ER scheme amendment, GPP will normally be retained for wells within the approval area. For wells outside the ER approval area, the AER may require the well licensees to address ER feasibility and the appropriateness of continued GPP status.

B) Wellbore Integrity and Completion Requirements

Wellbore integrity requirements and application processes are detailed in AER *Directive 051: Well Injection Requirements*.

The *Directive 051* application, in most cases, may be submitted before, at the same time as, or after the submission of the ER scheme application. Injection may not, however, begin without the receipt of written confirmation that the ER scheme application has been approved and the *Directive 051* requirements have been met.

C) Reserves

The AER sets ER reserves outside of the ER scheme application review process. A nominal amount of reserves information is required in all ER scheme applications, with more details possibly being required for applications involving more complex ER processes. ER scheme applications will not be delayed to conduct a detailed review of reserves, but ER reserves will be set as soon as possible after approval of an ER scheme. Approval holders may be required to provide additional, up-to-date reserves information outside the application review process.

Reserves changes are not communicated directly to companies, but AER reserves estimates are available upon request through the Customer Contact Centre. Any well rate administration changes that result from reserve changes are reflected in the monthly MRL order.

D) Use of Nonsaline Water

The AER supports the water management objectives of Alberta's *Water for Life: Alberta's Strategy for Sustainability* and the reduction plans outlined in the *Advisory Committee on Water Use Practice and Policy Final Report*. Accordingly, applicants proposing to use nonsaline water in an ER scheme must obtain prior approval from Alberta Environment and Sustainable Resource Development (ESRD) under the *Water Act* for the diversion of the nonsaline water. This approval must be obtained before submitting an application for an ER scheme to the AER. ESRD requires applicants for water diversion to fully investigate alternatives and submit evidence that there are no practical alternative saline water sources. For information on a water diversion application, contact the regional offices of ESRD.

2.1.2 AER Requirements and Expectations for ER Schemes

The AER's objective in regulating ER schemes is to ensure that hydrocarbon recovery is optimized. In meeting this objective, the AER must also ensure that scheme operations are conducted in a manner that is safe, is in the best interest of the public, protects the environment, and is fair to other well licensees.

2.1.2.1 Scheme Requirements

Scheme requirements are those rules that must be met and against which the AER will take enforcement action in cases of noncompliance. In addition to all other requirements of the *Oil and Gas Conservation Act* and *Rules*, the following are some specific requirements for all ER schemes:

- The approval holder is responsible for the successful operation of an ER scheme.
- The approval holder must comply with all conditions of ER scheme approvals.
- The approval holder must be the current operator of the scheme.
- All wells within the area of notification (table 1 in the Resources Applications Notification Guidelines section) must be confirmed to have been completed or abandoned in a manner that prevents the migration of the injected fluid to another formation.
- Injection must not begin in a well until after written confirmation that the ER scheme application has been approved and the *Directive 051* requirements have been met.
- The *Directive 051* application associated with the injection of Class IIIa and IIIb fluids for ER purposes must be submitted at the same time as the associated *Directive 065* application.
- Gas-cap gas production requires AER approval for concurrent production.
- The type of ER scheme (e.g., waterflood, miscible flood, gas cycling) must be selected to maximize hydrocarbon recovery.

- The type of injection fluid must be selected to maximize hydrocarbon recovery.
- All ER schemes must be operated in a manner that optimizes hydrocarbon recovery.
- The injection fluid must be compatible with the reservoir rock and reservoir fluid.
- The supply of injection fluid must be capable of maintaining the specified scheme voidage replacement conditions.
- Injection wells and their injection intervals must be located in a manner that optimizes both areal and vertical sweep efficiency.
- The proposed approval area must reflect the area that will be effectively swept by the injection wells and must conform to the AER-approved spacing.
- The approval will only list existing injection well locations, not those planned at some future date.
- Injection pressures must remain below the approved MWHIP at all times.
- The approval holder must comply with the initial and subsequent *Directive 051* requirements.
- Gas must be conserved in accordance with *Directive 060: Upstream Petroleum Industry Flaring Guide*.
- If an ERP is required for the injection of H_2S, an up-to-date, AER-approved ERP must be in place.
- The ER scheme approval area will not extend beyond the AER's pool order boundary for the subject pool.

2.1.2.2 Scheme Expectations

Although optimal operating practices may vary for each reservoir, there are fundamental principles and practices that the AER expects to be followed, in addition to the above-noted requirements, for all ER schemes. AER expectations on how ER schemes should be assessed, designed, implemented, and operated are described below.

A) Assessment Stage

- For all pools, including those that are on GPP, the feasibility of ER should be reviewed on an ongoing basis.
- For retrograde gas condensate pools, the feasibility of gas cycling should be evaluated before reaching the dew point pressure in order to maximize hydrocarbon recovery.
- Well licensees should collect the appropriate reservoir data necessary to accurately assess ER potential.

- ER should normally be evaluated and, if feasible, implemented in oil pools prior to the production of the gas cap and before the pool pressure declines below the reservoir fluid bubble point pressure.
- Pool delineation should be well understood prior to designing and implementing an ER scheme.
- The applicant should have a good understanding of the reservoir and fluid properties prior to designing the ER scheme.

B) Design Stage

- Produced water should be reinjected in water injection schemes.
- Production wells that are second or third line offset from injection wells should be included in the proposed scheme only when it is anticipated that the proposed injection wells will be able to provide adequate sweep and pressure support.

C) Implementation Stage

- Injection operations should be initiated at the optimal time. Injection should begin before the reservoir pressure drops below the bubble point pressure in oil pools or the dew point pressure in the case of retrograde gas condensate pools.
- Injection operations in all approved injection wells should begin as soon as possible. The AER will specify a deadline for the commencement of injection of three months from the date of the approval or amendment.

D) Operations

- If there are multiple well licensees within the approval area, the approval holder is expected to coordinate the scheme operations to ensure that maximum hydrocarbon recovery is attained.
- All well licensees in the approval area are expected to adhere to the approval conditions.
- Well licensees should collect the appropriate reservoir data necessary to accurately assess an ER scheme and optimize scheme performance.
- Alternatives to nonsaline water injection should be assessed on an ongoing basis.
- The entire approval area should have a uniform voidage replacement and pressure distribution.
- Where feasible and appropriate, the ER scheme should be operated at a reservoir pressure close to the bubble point pressure or dew point pressure.
- To provide operating flexibility, an ER approval does not need to be amended to remove wells that have ceased injection.
- Well licensees are expected to prudently produce their wells pending the successful implementation of ER.

- ER schemes should be monitored and adjustments or changes made to ensure optimum recovery.

2.1.3 Requirements for ER Scheme Applications

2.1.3.1 Requirements That Must Be Met Before an ER Application Is Submitted

An ER application may be submitted to the AER once the following requirements have been met:

- The primary applicant has obtained the right to represent all well licensees within the proposed approval area.
- The primary applicant has notified all well licensees in accordance with the requirements in section 2.1.3.2.
- The proposed injection wells have been drilled.
- The source of the proposed injection fluid has been secured.
- There are no differences between the applicant's and the AER's interpretation of pool delineation that are pertinent to the ER scheme.
- For a scheme amendment, the primary applicant is the approval holder.

2.1.3.2 Notification Requirements for ER Scheme Applications

An applicant must provide proper notification, including scheme details such as approval area, type of ER scheme, and injection well locations, to all well licensees at least 15 working days before submitting the application to the AER. Failure to complete notification as required may result in an application being closed without being processed.

Minimum Notification Requirements

Applicants for enhanced oil recovery (ER) schemes (new and amendment) must follow the notification guidelines in tables 1, 2, and 3.

Special circumstances, such as pressure communication between pools through a common aquifer, may expand the notification requirements.

The AER expects well licensees to act in the best interest of all parties with an interest in a well, including lessees and lessors, particularly in cases of mixed ownership within the proposed approval area.

Applicants must retain the list of well licensees notified about the proposed scheme/amendment, the notification document, the date of notification, and any responses or comments received. This information is not required to be submitted as part of the ER application unless there are unresolved licensee concerns. In this case, a Licensee Concerns attachment must be included.

2.1.3.3 Forms and Attachments Required for ER Scheme Applications

A) Summary of Required Application Documents

All ER scheme applications must include

- Resources Applications – Schedule 1
- ER scheme application form (appendix F)
- Attachments
  - Application
  - Approval area map
  - Pressure-volume-temperature (PVT) data
  - Reserves data
  - Injectivity test data (if not available, MWHIP prescribed by table 1 of appendix O)
  - Licensee concerns (if there are any unresolved concerns)
  - Isopach map (for new ER schemes and significant area amendments)
  - Well logs (for new ER schemes and significant area amendments)
  - Pressure data and interpretation (for new ER schemes and significant area amendments)
  - Structure map (for new gas cycling schemes)
  - Miscellaneous (additional information to support the request)

Further explanation on the ER scheme application form and attachments is provided in the following sections (B) and (C).

B) Explanatory Notes for ER Scheme Application Form Questions

The ER scheme application form is in appendix F. The numbering below corresponds to the questions on the form.

Application Type

1) Type of ER scheme being proposed or amended:

Only one type of ER scheme may be selected. Although schemes may have multiple types of injection fluid, there generally is a predominant recovery mechanism or scheme type. For example, a scheme with water-alternating-gas (WAG) injection is a miscible scheme even though solvent, water, and gas would be injected during the scheme's life.

If you choose Other, you must include a description of the ER process and supporting technical documents/papers discussing the method in the application.

2) Is this application for a new ER scheme or for an amendment to an existing ER scheme approval?

If an AER approval for ER does not exist for the subject scheme, select New.

If an AER approval for ER exists for the subject scheme, select Amendment.

3) What is the existing AER approval number proposed for amendment?

If the application is for an amendment to an existing ER scheme approval, enter the current approval number without alpha characters.

4) Type of Amendment:

If the application is for an amendment to an existing ER scheme approval, the type of amendment must be selected. Multiple amendment types may be selected, with the exception of "Scheme termination," which must be a singular ER scheme amendment type.

Add injection well locations: Select this box if you are requesting approval to add one or more injection well locations to the approval.

Amend approval area: Select this box if you are requesting a change to the current approval area (shown in the appendix to the approval). The proposed approval area should reflect the area that will be effectively swept by the injection wells and should conform to the AER-approved spacing.

Amend approval conditions: Select this box if you are requesting a change to a condition of the approval. For example, this could include changes to the minimum operating pressure or voidage replacement requirements, but not a change to the holder of the approval.

Scheme termination: Select this box if you are requesting approval to rescind the ER approval.

Ownership and Notification Information

5) The primary applicant must

a) be the proposed approval holder for a new scheme or the current approval holder for an existing scheme, and

b) represent all well licensees in the proposed approval area.

Have these requirements been met?

YES means that both of these requirements have been met and the primary applicant accepts responsibility for compliance with all conditions of the approval.

NO means that one or both of these requirements have not been met, and as a consequence the application may not be submitted. Any request to change the approval holder must be made in accordance with unit 5 of this directive.

6) *An ER scheme application cannot be submitted until notification of all well licensees has been completed in accordance with* Directive 065.

Has notification been completed in accordance with *Directive 065*?

YES means that the notification requirements specified in section 2.1.3.2 have been met.

NO means that these requirements have not been met. An ER scheme application may not be submitted until these requirements have been met.

7) *Are there outstanding concerns from well licensees? If yes, the licensee concerns attachment must be submitted as part of the application, in accordance with* Directive 065.

YES means that there are unresolved concerns or objections from one or more of the well licensees that were notified of the application. The information required in a licensee concerns attachment is identified in section 2.1.3.3(C) of this directive.

NO means that there are no known unresolved well licensee concerns from any of the well licensees that were notified of the application.

Proposed Injection Well Locations and Injection Intervals

This section must only be completed for new ER schemes and amendment types when requesting to add injection well locations.

8) *An ER scheme application cannot be submitted unless the proposed injection wells have been drilled.*

Have the proposed injection wells been drilled?

YES means that all the proposed injection wells have been drilled.

NO means that all the proposed injection wells have not been drilled. The AER is not prepared to accept an ER application when the proposed injectors are not drilled because of the potential this creates for changes to the scheme details (commencement of injection date, bottomhole location of injector, and the unconfirmed presence and quality of the reservoir).

9) *An ER scheme application cannot be submitted unless the source of the proposed injection fluid has been secured.*

Has the source of the proposed injection fluid been secured?

YES means that the supply of injection fluid is secured and will be available for use by the proposed injection date.

If nonsaline water is to be used for injection, you must have a valid water diversion permit from ESRD. The water diversion permit number must be provided in the application attachment.

NO means that the injection fluid source has not been secured. The AER is not prepared to accept an ER application when the injection fluid has not been secured because of the potential for delays in the commencement of injection.

10) *Provide the following for the proposed injection well locations:*

Well Licence Number: The well licence number issued by the AER for the proposed injection well.

Unique Well Identifier (UWI): The UWI (LE/LSD-SEC-TWP-RGEWMER/ES) associated with the well licence number. This parameter is populated on the basis of the well licence number provided. Please note that only wells with an active status can be used here.

Injection Interval: The top and base depth of the injection interval.

Porosity Interval: The porosity top and porosity base depth of the reservoir proposed for injection.

Fluid Interface: The current gas/oil and oil/water depths (if applicable) in the reservoir proposed for injection. These depths may be measured or estimated.

11) *What type of injection fluid, as identified by* Directive 051, *will be used?*

Multiple injection fluids may be selected. Further descriptions of the injection classes are in *Directive 051*.

11a) *If an injection fluid contains H_2S and an emergency response plan (ERP) is required, the AER must ensure that an up-to-date ERP is in place prior to its decision on the application.*

Is an AER-approved ERP incorporating the proposed scheme in place?

If no, a discussion addressing the status of the ERP must be included in the application attachment, in accordance with Directive 065.

There are additional environmental and safety concerns that need to be addressed when the injection fluid contains any H_2S. Therefore, the AER must ensure that the need for the ERP has been addressed, and if one is required that the AER Emergency Preparedness and Audit Section has approved an ERP that encompasses the proposed scheme before making a decision on an application.

YES means that an AER-approved ERP incorporating the proposed scheme is in place.

NO means that either an AER-approved ERP incorporating the proposed scheme is required but not in place or that an ERP is not required. For either situation, an explanation must be provided.

ERPs should be forwarded directly to the AER Emergency Preparedness and Audit Section for review. See *Directive 071* for further details on emergency response planning.

12) *Will injection commence in all proposed injection wells within three months of receipt of approval?*

    If no, a discussion addressing the anticipated commencement of injection and the reason for the delay must be included in the application attachment, in accordance with Directive 065.

YES means that injection will begin within three months of the date of approval. This commencement of injection date will be a condition of the approval.

NO means that injection will not begin within three months of receipt of approval. Provide reasons for the delay in the commencement of the injection date beyond the standard three-month period. If injection will not begin within three months, the AER will generally not grant GPP at the time of the ER approval due to conservation concerns. The AER may decide to grant GPP after written notification to the AER that injection has begun.

Proposed Approval Area

This section must only be completed for new ER schemes and amendment types when requesting an amendment to the approval area.

13) *Is the entire proposed approval area within the AER's pool order boundary for the subject pool?*

YES means that the entire proposed approval area is within the AER's current pool order boundary for the subject pool.

NO means that the proposed approval area extends beyond the AER's current pool order boundary for the subject pool. The AER cannot approve ER approval areas larger than the pool order boundary. Differences in pool delineation should be addressed before submitting the ER application. Note that the approval area will not include injectors without hydrocarbon pay, but such injectors may be listed in the approval.

The AER's pool order boundaries are under the AER Order System on the Systems & Tools portal of the AER website, www.aer.ca.

14) Does your interpretation of pool extent correspond to the AER's pool order boundary for the subject pool?

YES means that your interpretation of pool extent coincides with the area identified by the AER's current pool order boundary for the subject pool.

NO means that your interpretation of pool extent does not coincide with the area identified by the AER's current pool order boundary for the subject pool.

The AER's pool order boundaries reflect quarter section for wells with oil pay and one section for wells with gas pay.

15) Is the difference in pool delineation interpretation pertinent to the proposed ER scheme, in accordance with Directive 065?

Provide a discussion of the difference in pool delineation and the pertinence to the proposed ER scheme in the application attachment, in accordance with Directive 065.

A difference in pool delineation is considered pertinent if it affects any of the following aspects of the proposed ER scheme: approval area, approval conditions, notification, or approved injection wells.

Pool delineation is very important to the AER's review of any ER scheme. The assessment of the effectiveness of the proposed scheme relative to the optimal depletion strategy for the entire pool requires that overall pool delineation be known. Also, accurate pool delineation is necessary to allow for the identification of possible equity concerns involved with the proposed ER scheme.

YES means that your pool interpretation differs from that of the AER in a manner that could affect the ER approval. Significant differences in pool delineation must be dealt with before making an ER scheme application. However, an exception may be where the proposed approval area is larger than the pool order boundary due to wells that are yet to be evaluated by the AER.

NO means that your pool interpretation differs from that of the AER in a manner that does not affect the ER approval. For example, the recognized differences are significantly outside of the proposed approval area.

If the proposed approval area extends beyond the AER's pool order boundary for the subject pool or your interpretation of pool extent does not coincide with the AER's pool order boundary for the subject pool, an explanation of the difference and a discussion of why this difference is not pertinent to the proposed ER scheme must be provided.

Scheme Details

16) *Is the scheme area currently administered under good production practice?*

YES means that all of the wells within the proposed approval area have been granted GPP.

NO means that some or all of the wells within the proposed approval area are subject to a prescribed maximum rate limitation (MRL) or that the proposed scheme is in a gas pool.

A copy of the most recent MRL order can be found on the AER's website.

17) *Will produced gas from the ER scheme area be conserved, in accordance with* Directive 060 *requirements?*

The AER expects that gas conservation is in accordance with Directive 060. See *Directive 060* for further information.

18) *What is the proposed voidage replacement ratio (VRR), on a monthly basis, for the scheme?*

> *The AER normally specifies a VRR of 1.0 to fully maintain reservoir pressure. If the VRR will not be 1.0, provide a technical justification in the application attachment, in accordance with* Directive 065.

Specify the proposed monthly VRR for the scheme. The VRR should reflect the injection into and production from the total scheme area. Technical justification for a VRR other than 1.0 must be provided, along with the reasons for the over- or under-injection and its impact on scheme recovery. The AER will normally specify a VRR as a condition of the approval.

19) *Is or will any gas-cap gas be produced from the subject pool during the operation of the ER Scheme?*

> *If yes, include a discussion on the potential for fluid migration into the gas cap in the application attachment, in accordance with* Directive 065.

YES means that gas-cap gas is or will be produced from the pool, either within or outside of the scheme area, during the period that the ER scheme is operational.

If any gas-cap gas is or will be produced from the subject pool during the operations of the ER scheme, provide a discussion on the potential for fluid migration from the scheme into the gas cap and pressure depletion in the scheme due to gas-cap gas production. If potential for fluid migration or pressure depletion is identified, the discussion should include the impact on ultimate hydrocarbon recovery.

NO means either that there is no associated gas cap in the pool or that the associated gas cap will not be produced during the period that the ER scheme is operational.

20) Is gas-cap gas currently being produced from the scheme area?

YES means that an associated gas cap is present in the pool and this gas is currently being produced from the scheme.

NO means that an associated gas cap is present in the pool but this gas is not currently being produced from the scheme.

20a) Has the appropriate concurrent production (CCP) approval been issued?

If question 20 is answered yes, gas-cap gas is currently being produced from the scheme area and this question must be answered.

YES means that the appropriate form of concurrent production that encompasses the current gas-cap gas production has been approved by the AER. The CCP approval details are listed in the AER's MRL order.

NO means that the current gas-cap gas production has not been approved by the AER.

20b) An application for CCP is required. Has an application for CCP been registered?

If question 20a is answered no, the current gas-cap gas production has not been approved by the AER and this question must be answered.

YES means that an application for CCP has been registered with the AER.

NO means that an application for CCP has not yet been registered with the AER. Unauthorized CCP is not permitted; an application for CCP is required pursuant to section 39(1)(f) of the *OGCA* and section 2.4 of this directive.

20c) If yes, provide the CCP application number.

If question 20b is answered yes, an application for CPP has been registered with the AER and this question must be answered.

If an application for CCP has been registered, enter the AER application number. Information details on applications registered with the AER are on the AER's website.

C) Explanatory Notes for ER Scheme Application Attachments

Application Attachment

1) Provide an attachment that describes the proposed scheme, including
    - the proposed injection pattern;
    - the expected sweep efficiencies (e.g., vertical, areal);

- the displacement type (e.g., bottom water drive, horizontal);
- the measures taken to prevent channeling and to maximize the swept reservoir volume;
- the proposed date of commencement of injection;
- the approximate date when the proposed VRR will be achieved; and
- the type, composition, and source of the injection fluid, including chase gas for miscible floods. For changing injection fluid compositions, provide the anticipated range of compositions; for nonsaline water injection, provide the water diversion permit number.

2) If an injection fluid contains any H_2S and an ERP is required, include a statement that an up-to-date ERP incorporating the proposed scheme is in place or a discussion addressing the status of the ERP update. If an AER-approved ERP is not required for the proposed scheme as per *Directive 071* requirements, include an explanation of why an ERP is not required.

3) If all of the proposed injection wells will not begin injection within three months of the approval date, include a discussion addressing the anticipated commencement of injection for each injection well and the reason for the delay. Injection dates up to six months from the date of approval may be considered by the AER.

4) If your interpretation of pool delineation is different than the AER's interpretation, as reflected by the current pool order boundary, include a discussion of the difference in pool delineation and why the difference is not pertinent to the proposed ER scheme. In cases where wells in the proposed scheme area have not yet been evaluated by the AER, the wells requiring review should be identified.

5) If the proposed VRR is not 1.0 on a monthly basis, provide technical justification for a VRR other than 1.0, including the reasons for the over- or under-injection and its impact on scheme recovery. For example, if partial pressure maintenance is provided by an associated aquifer, include detailed analysis to show that the proposed VRR in combination with the aquifer will maintain reservoir pressure.

6) If any gas-cap gas is or will be produced from the subject pool during the operations of the ER scheme, provide a discussion on the potential for fluid migration from the scheme into the gas-cap and pressure depletion in the scheme due to gas-cap gas production. If potential for fluid migration or pressure depletion is identified, the discussion should include the impact on ultimate hydrocarbon recovery.

7) If any gas-cap gas is currently being produced from the proposed scheme area and the appropriate concurrent production approval does not exist, provide a discussion of your plans to submit a concurrent production application.

Approval Area Map Attachment

Maps showing

1) the AER's current pool order boundary for the subject pool (see the AER Order System on the Systems & Tools portal of the AER website);
2) the location and current status (indicated by well symbols) of each well
    - within the proposed approval area and
    - within the notification area specified in section 2.1.3.2,

    with wells completed in the pool highlighted;
3) the outline of other existing ER recovery scheme approval areas within the pool that offset the subject scheme; and
4) for a **new ER scheme**, include the applied-for approval area, and for an **ER amendment application**, include the current approval area and any proposed areas of amendment and the zero edge of the pool.

The proposed approval area must reflect the area anticipated to be swept by the scheme injectors and should conform to the AER-approved drilling spacing units.

For clarity, the information may be provided on separate maps.

For very large pools, the map should focus on the region in and surrounding the scheme area.

For a new scheme, the net oil/gas pay isopach maps must be provided as a separate attachment. For scheme amendments, the pool zero edge in the region of the proposed scheme area must be provided.

PVT Data Attachment

PVT properties, including

1) the initial reservoir pressure,
2) the proposed operating pressure of the scheme,
3) the current average reservoir pressure within the scheme area,
4) the saturation (bubble point) pressure,
5) the reservoir temperature,
6) the B_{oi}, B_{gi} (if applicable), R_{si}, and B_{wi} values,

7) the B_o, B_g, R_s, and B_w values at the current average reservoir pressure within the scheme area, and

8) the source of the PVT data.

For gas cycling schemes, substitute the dew point pressure for item (4), and the full constant volume depletion analysis of the reservoir fluid for items (6) and (7).

All data must be in metric units.

Along with the stage of reserves recovery, the value of the bubble point or dew point relative to the current and proposed operating pressures is an important consideration when evaluating an ER scheme.

Reserves Data Attachment

Estimates of the oil and gas reserves, including

1) the initial oil and gas volumes in place for the ER scheme area,

2) the oil and gas recovery factors under the existing depletion mechanism and under the proposed ER scheme,

3) the recoverable oil and gas reserves for the scheme area,

4) the reservoir area, average net pay, average porosity, and average water saturation for oil and gas in the scheme area,

5) a description of the methods used in determining the estimates for (1) and (2) above (e.g., material balance, volumetric analysis, model study, a comparison of analog pools, and sweep and displacement efficiencies), and

6) for gas cycling schemes, the initial propane, butane, and condensate in place converted to liquid volumes.

A fundamental service that the AER provides to all stakeholders is maintaining reserve estimates for all pools in Alberta.

A nominal level of reserves information is required in ER scheme applications, and more detail may be required for applications involving more complex ER processes. As well, additional information may be requested during the application review, after approval, or during a future audit.

Maximum Wellhead Injection Pressure Attachment

All injection wells will be subject to a MWHIP. Best practices for the determination of the MWHIP are based on the formation fracture pressure with a safety factor applied. The formation fracture pressure may be determined from a step-rate injectivity, in-situ stress tests, or reliable and analogous offset data. In the absence of such information, the MWHIP prescribed in appendix O, table 1, will be assigned to the injector.

The requirements for the determination of MWHIP include

- a statement on the basis of the proposed MWHIP, if requesting MWHIP other than as prescribed by appendix O, table 1;
- a technical justification for all analogous source proposals;
- a technical justification for the proposed MWHIP. This will include the complete test data and all analysis;
- a discussion about the proposed safety factor for use in the determination of the MWHIP to ensure fluid containment; and
- the wellbore configuration expected to be used during injection operations. Any deviations from this configuration that could result in a higher bottomhole injection pressure will require a *Directive 065* application for a revised MWHIP.

Licensees are responsible for providing the historical wellhead injection pressure data to the AER for an audit.

An application for the amendment of the MWHIP, assigned with appendix O (table 1), should be submitted as an ER scheme (amend) application through DDS, addressing the above requirements for MWHIP.

Licensee Concerns Attachment

If there are unresolved concerns from a well licensee, provide an attachment that includes the following information:

1) contact information for the well licensee that has unresolved concerns;
2) a copy of the notification letter provided to the well licensees;
3) a list of any other documents distributed;
4) copies of any statements of concerns received, or if not available, a summary of issues;
5) a chronology of any discussions conducted with the well licensees;
6) a discussion of how the applicant would like the AER to proceed with the application; and
7) a statement on the steps taken to mitigate the unresolved concerns and the applicant's response to the concerns.

Isopach Map Attachment (for new ER schemes and significant area amendments)

Provide an isopach map of net oil and/or gas pay showing

1) the location of the initial fluid interfaces (gas-oil, gas-water, oil-water), and
2) the location and current status (indicated by well symbols) of each well within and offsetting the proposed approval area.

The AER requires the geological extent and hydrocarbon pay thickness of a pool, any fluid interfaces, and well control with statuses to assess how the proposed scheme relates to optimum pool depletion, other existing schemes, and potential pool delineation and equity issues.

For very large pools, the map should focus on the region in and surrounding the scheme area.

Well Log Attachment (for new ER schemes and significant area amendments)

Provide an interpreted and annotated log cross-section or representative well logs showing

1) stratigraphic interpretation of the zones of interest,
2) interpretation of fluid interfaces (original and current, if applicable),
3) completion and treatments to the wellbores, with dates,
4) cumulative production,
5) finished drilling date and kelly bushing elevation, and
6) the scale of the log readings.

This cross-section may be presented in a number of ways—as one representative well log, several well logs, or a detailed cross-section of the entire pool—depending on the complexity and heterogeneity of the pool. The information on this cross-section assists in establishing the vertical continuity within the pool and the overall quality of the pool.

Pressure Data and Interpretation Attachment (for new ER schemes and significant area amendments)

Provide reservoir pressure data, including

1) measured or estimated reservoir pressures for the scheme area,
2) the source of the data, and
3) a discussion of how the pressure data relates to and supports the scheme operations.

The applicant must include all pressure data available for scheme wells. The data may be presented in various formats, such as a pressure-time plot, an isochronal map, or a table illustrating the pressures for the scheme wells. Pressure data should be corrected to the AER established pool datum.

All pressure data must be in metric units.

Reservoir pressure data are a key component in ensuring the success and optimal operation of ER schemes. Taking timely and representative reservoir pressure measurements ensures that the necessary information is available to help monitor and optimize scheme performance. All new ER schemes will be added to the annual pressure survey schedule unless otherwise stated.

Structure Map Attachment (requirement for new gas cycling schemes)

Provide a structure map of the subject pool clearly identifying interpreted fluid interfaces (current and original, if applicable), stratigraphic horizon, and contoured surface (porosity top or formation top).

If the proposed ER scheme is for a gas cycling scheme or an ER scheme where vertical displacement is important for evaluating the scheme design, a structure contour map must be provided.

D) Additional Requirements for ER Scheme Amendment Applications

The requirements listed in this section are supplemental to the mandatory requirements and vary according to the type of amendment.

Add Injection Well Locations

Provide a technical explanation of why the additional injection locations are required and how they are consistent with the optimal depletion strategy, which is to ensure that hydrocarbon recovery from the scheme area is maximized.

Amend Approval Area

Provide a written description of and technical justification for the proposed changes to the approval area. For a significant expansion to the area of an existing scheme, the AER requires the isopach map, well logs, and pressure data and interpretation attachments.

Amend Approval Conditions

Provide the specific details of and technical justification for the proposed changes to the approval conditions.

Scheme Termination

An application to rescind an ER approval is required to terminate an ER scheme. Generally, termination of the scheme involves ceasing all injection.

An application to rescind an ER approval must include

1) a discussion of the reasons for termination of the scheme, including how the pressure and production performance justifies the request for termination;
2) a detailed economic analysis to show that continued injection is uneconomic—the AER may request further economic justification for scheme termination in certain cases;
3) a discussion of other scenarios, apart from ceasing injection completely, that were considered—for example, partial pressure maintenance, well recompletions, or workovers;
4) a discussion of the future depletion strategy for the approval area and the remaining recoverable reserves; and
5) a discussion of the success of the ER scheme, including the details of the actual incremental volumes by recovery mechanism (e.g., primary, waterflood, gas cycling, miscible flood).

All scheme amendment applications must include a statement on the state of compliance with the existing approval conditions.

E) Additional Requirements for Miscible Flood Scheme Applications

The requirements listed in this section are supplemental to the mandatory requirements and are specific to new miscible flood schemes. Amendments to existing miscible flood schemes should only address the requirements necessary to justify the request.

An application for a new miscible flood scheme must include

1) proof of miscibility with the reservoir oil; proof usually requires slim tube or rising-bubble tests over a range of injection fluid compositions and/or pressures to establish the point or boundary of miscibility;
2) the proposed miscibility conditions, as appropriate, established from the following:
    a) the minimum miscibility pressure (MMP) at the proposed composition of the injection fluid:

       The MMP is the lowest pressure for which the injection fluid can develop miscibility through a multicontact process with the given reservoir oil at reservoir temperature. To maximize oil recovery, the AER may specify a minimum operating pressure (MOP) in the approval. The specified MOP will usually be nominally higher than the MMP to incorporate a safety factor for miscibility;

   b) a correlation of injection fluid composition versus operating pressure;
   c) the minimum pseudocritical temperature of the injection fluid and MOP;
   d) the minimum C2+ content of the injected fluid and MOP; and
   e) other conditions to ensure miscibility;

3) for WAG schemes, the proposed WAG ratio target and range and WAG cycle, along with the technical justification; and

4) the methodologies proposed to be used to determine when injection fluid breakthrough occurs and to calculate the volumes of injection fluid breakthrough. Fluid sampling and analysis for miscible flood schemes, where required, have the following minimum requirements:
   a) gas sampling and analysis on a quarterly basis for all produced wells where no other method is available for the estimation of the breakthrough volumes of each fluid at the producers; and
   b) sampling and analysis of the injected solvent and chase gas on a monthly basis.

F) Additional Requirements for Gas Cycling Scheme Applications

If an operator considers gas cycling appropriate, an application for an ER scheme must be submitted. Amendments to an existing gas cycling scheme should only address the requirements necessary to justify the request. In addition to the requirements for an application for a new ER scheme, an application for a new gas cycling scheme must include

1) the proposed rate of cycling and the cycling period before blowdown commences with supporting technical and economic data;

2) the following historical and forecast annual production under various depletion strategies (including primary depletion, partial gas cycling, and full gas cycling):
   a) raw gas,
   b) sales gas,
   c) individual liquid coproducts, and
   d) sulphur;

   this performance information for gas cycling schemes should provide the basis for the economic evaluation used in determining the optimum depletion strategy;

3) the forecast annual gas injection showing the portion of make-up gas versus reinjected gas;

4) the composition of the current gas-cap gas, and the average composition of the injected gas on an annual basis;

5) the estimated liquid and sales gas recovery by the various depletion strategies compared to primary depletion; and

6) economic evaluation used to determine the optimum depletion strategy.

The quantification of natural gas liquids carried in the gas cap is of primary importance to the feasibility of the scheme.

2.1.4 ER Related Processes

2.1.4.1 Reporting Requirements

Progress reports for most ER schemes (waterfloods and immiscible gas floods) were eliminated with *Bulletin 2008-18: Regulatory Change Report and Regulatory Documents in Effect*. Reporting is still required in the following situations for ER schemes:

1) progress reports for active miscible flood must include the following:
    a) the method used to determine the solvent and chase gas breakthrough volumes and compositions, with detailed example calculation;
    b) either monthly and cumulative volumes of produced solvent and chase gas on an individual well and scheme basis, or the allocation factors used to calculate the breakthrough volumes;
    c) monthly and cumulative compositions of produced solvent and chase gas summarized on a scheme basis, and, where appropriate, summarized on a pattern, area, stage, or phase basis; and
    d) monthly and cumulative compositions of injected solvent and chase gas summarized on a scheme basis;
2) progress reports and/or performance presentations for gas cycling schemes;
3) reporting required as a condition of an AER approval or letter; and
4) any reporting required as follow-up to AER audit and surveillance processes, including reserve estimates.

2.1.4.2 Audit, Surveillance, and Enforcement

The AER will audit all new ER schemes and selected scheme amendments about 12 months after approval issuance. These audits will be conducted to

- confirm compliance with approval conditions,
- review scheme performance (actual versus predicted) to identify any issues, and
- validate data integrity.

If issues arise, the AER may request additional information or clarification from the approval holder, take appropriate enforcement action, and require corrective measures necessary to protect the oil and gas resource, equity, safety, and the environment.

In addition to the twelve-month audit, the AER will conduct surveillance on all provincial ER schemes on an ongoing basis. Random or targeted reviews may be conducted to ensure that compliance is met and that performance is consistent with expectations. If compliance or performance issues are identified, the AER will take appropriate enforcement action and require the approval holder to implement corrective measures.

2.2 Enhanced Oil Recovery Project

[Rescinded]

2.3 Enhanced Recovery Recognition and Good Production Practice for Enhanced and Oil Recovery Schemes

[Rescinded]

2.4 Application for Concurrent Production

2.4.1 Background

Concurrent production (CCP) is defined as the production of an oil accumulation and its associated gas cap at the same time. Section 39(1)(c) of the *Oil and Gas Conservation Act* requires that no CCP scheme may proceed unless approved by the AER. CCP is a poolwide depletion decision requiring equitable treatment of all participants with productive wells.

2.4.2 When to Make This Application

If there is a need or desire to produce gas-cap gas either directly via a gas well or indirectly through oil zone perforations, application must be made to the AER.

CCP approval can take the form of one or more of the following:

- outright CCP that allows for production of gas-cap gas from both oil and gas wells
- CCP where gas may be produced through the oil zone perforations only
- CCP with a maximum gas withdrawal rate
- CCP with a maximum gas-oil ratio (GOR) above which the wells must be shut in
- CCP where only certain wells may be produced
- CCP for specific areas of a pool

2.4.3 Terms of Approval

A CCP application would likely be approved if the AER is satisfied that

1) gas-cap gas production would have a negligible impact on the ultimate oil recovery from the pool or that gas-cap gas production is unavoidable if oil is to be recovered from a given pool,
2) all gas production is or will be conserved, and
3) all potentially adversely affected parties in the pool agree with the proposed CCP scheme.

2.4.4 Requirements for an Application for Concurrent Production

Conservation

Requirements	**Comments**
1) Your geological interpretation of the pool involved, including	
a) oil and gas net pay isopach maps of the pool;	
b) where pool delineation or fluid interface locations are based on structural interpretation, a structure contour map of the pool and offsetting area;	
c) an interpreted and annotated log cross-section or representative well log(s) showing the	
i) stratigraphic interpretation of the zone(s) of interest,	
ii) interpretation of the fluid interfaces present,	
iii) completions and treatments to the wellbore(s) with dates,	
iv) cumulative production,	
v) finished drilling date and kelly bushing (KB) elevation, and	
vi) the scale of the log readings; and	
d) a tabulation of your interpreted net pay, porosity, and water saturation for each well in the pool, along with the cutoffs, methodology, formulas, and constants used.	

2) If you are applying for CCP through certain wells, a list of the wells proposed for CCP.	
3) A statement of whether you have attempted recompletion efforts to reduce gas-cap gas production. If yes, state the results. If no, explain why not.	Gas cap production from oil wells may be reduced or eliminated by reperforating the well lower in the zone.
4) Your evaluation of the oil and gas reserves for the pool, including a) an estimate of the initial oil volume and gas volume in place, b) an estimate of the oil and gas recovery factors under the existing depletion mechanism and under the proposed CCP depletion strategy, c) a description of the methods used in determining (a) and (b) above (e.g., material balance, volumetric analysis, model study, a comparison of analog pools), and d) the supporting data used in determining (a) and (b) above and the sources of the data (e.g., pressure/volume/temperature [PVT] properties and source, pressure data and source).	The stage of depletion of the pool may influence the AER's decision and should be discussed where appropriate.
5) An estimate of the current oil in place and gas in place and an estimate of the annual oil and gas production under CCP.	An understanding of the current stage of depletion of the subject pool and the future rate of depletion of the gas cap(s) and the oil zone is key to evaluating the appropriateness of CCP for a pool.

6) An estimate of the gas cap segregation drive index, with supporting data and calculations.	Depending on its size relative to the associated oil pool, a gas cap can be a valuable source of pressure to the pool.
7) A discussion of whether you plan any operational changes for the subject pool (such as infill drilling) and, if so, what they are.	Potential changes to a pool, such as infill drilling, pool expansion, and changes in production operations, can alter a pool significantly, and hence a decision on CCP would be deemed premature.
8) Comments as to the feasibility of enhanced oil recovery and gas cycling if there is a retrograde condensate gas cap in the subject pool.	A request for CCP is premature if enhanced recovery or gas cap cycling are feasible but have not been implemented in the pool.
9) Confirmation that all gas will be conserved; if this is not the case, a detailed discussion on the feasibility of gas conservation.	Except in cases where gas production is unavoidable, gas production would not generally be approved in the absence of gas conservation. Your evaluation of gas conservation should use the decision tree and economic decision process set out in AER *Directive 060*, sections 2.3 and 2.4. Under full gas conservation, only nonroutine flaring can occur. *Directive 060*, section 2.6, defines nonroutine flaring at conserving facilities and specifies operational requirements to minimize this flaring. Failure to address gas conservation in accordance with *Directive 060* may result in processing delays and deficiency requests.

10) An estimate of the ultimate oil and gas recovery from the subject pool under the status quo and under the proposed CCP.	Approval of CCP is contingent upon the gas production having little or no negative impact on ultimate oil recovery from the given pool.

Equity

Requirements	**Comments**
1) Documentation identifying notification to the unit operators, approval holders (if applicable), or well licensees in the AER-designated pool.	CCP applications often involve complex oil and gas equity issues. Failure to notify others involved in the pool will result in the return of your application.
2) Documentation confirming nonobjection from the above parties or specific details regarding their statement of concern.	

2.5 Application for Pool Delineation and Ultimate Reserves

2.5.1 Background

The AER establishes pool boundaries (vertically and horizontally) and assigns reserves to all oil and gas pools in Alberta. These are shown in Pool Orders (G Orders), annual reserve publications, and individual well and pool files. Well licensees of new oil wells outside of established G Orders must submit a completed application for a New Well Base Allowable or Base MRL (O-38 form).

The initial oil volume or gas volume in place for new pools is often based on simple building-block assignment areas and wellbore parameters. Initially, recovery factors for new pools may be based on analog pools in the area. Initial delineation reflects early geological and pressure information. As the pools are developed and further well data and performance data are available, delineation and reserves may be adjusted to reflect this new information. Net pay isopach maps, material balance analyses, decline analyses, and analytical and numerical models may take the place of the simple building-block approach. Different pressure trends or new gas/oil or oil/water interface information may alter pool boundaries.

The interpretation of pool reserves and delineation can affect regulatory requirements related to the operation and development of oil and gas pools in Alberta, as well as equity-related issues between operators.

2.5.2 When to Make This Application

Following the initial well assignment and if additional information becomes available that substantially changes current decisions, a well licensee may choose to, and in fact is encouraged to, make an application to change assigned reserves or vary pool delineation for several reasons, including

- **conservation** (For example, new evidence may permit a restricted gas well to produce if it is no longer within a gas cap or the second well in a DSU.)
- **equity** (For example, new evidence supports delineation for a well to a pool with a higher MRL or GPP.)
- **future applications** (For example, while reserves evaluations are required in many other applications in this directive, an applicant may choose to file a standalone reserve application. Maintaining a common reservoir information base or understanding differences may assist or accelerate processing future applications for matters addressed in this directive.)
- **provincial records** (For example, pool boundaries and reserves are the foundation for conservation and equity protection.)

The AER monitors pool performance and interprets new well information. As a result, the AER may also request well licensees to file reserve submissions to update reserves for pools of provincial significance.

2.5.3 How the AER Processes the Application

Upon receipt of a standalone pool delineation or reserve application, the AER analyzes the new evidence, reviews the applicant's interpretation, and assesses potential alternatives.

These applications are considered a technical information submission, and as such there are no specific requirements to notify and discuss the different interpretations with other well licensees.

The AER may seek input on the delineation or reserve interpretation from well licensees in the area as part of the overall review and may hold a hearing into the matter. The AER will consider all input prior to rendering a decision. This decision may not agree with the applicant, who may reapply as additional information becomes available.

2.5.4 Requirements for an Application for Pool Delineation

Requirements	Comments
1) The data and your interpretation, if the basis for proposing a pool delineation change is a specific, definitive piece of evidence.	There may be a sharp contrast in performance between wells, such as distinctly different pressure data, that conclusively supports delineation changes. Building-block reserves may be split or adjusted to reflect new boundaries.
2) A detailed reserve submission, if the basis for proposing a pool delineation change is a composite of indicators.	Analysis of a set of data provides for identification of both supporting and refuting elements and a "best fit" decision.

2.5.5 Requirements for an Application for Ultimate Reserves

Requirements	Comments
1) Your geological interpretation of the pool, including	Your application must provide a geological interpretation of the entire pool, not just the portion underlying lands you own.
a) a net pay isopach map of the pool, including both oil and gas if there is an associated pool;	If it will help to clarify your basis for pool delineation or other aspects of your geological interpretation, you should submit a log cross-section containing wells both within and outside of the pool. As a minimum you must submit at least one representative well log from a well in the pool showing the information required in 1(c).
b) where pool delineation or fluid interface locations are based on structural interpretation, a structure contour map of the pool and offsetting area;	

c) an interpreted and annotated log cross-section or representative well log(s) showing the
   i) stratigraphic interpretation of the zone(s) of interest,
   ii) interpretation of the fluid interfaces present,
   iii) completions and treatments to the wellbore(s), with dates,
   iv) cumulative production,
   v) finished drilling date and kelly bushing (KB) elevation, and
   vi) scale of the log readings; and

d) a tabulation of your interpreted net pay, porosity, and water saturation for each well in the pool, along with the cutoffs, methodology, formulas, and constants used.

Your application will have fewer processing delays if you provide a clear picture of your geological interpretation, including the potential for further pool development.

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2) Your evaluation of the oil and gas reserves for the pool, including
   a) an estimate of the initial oil volume and gas volume in place,
   b) an estimate of the oil and gas recovery factors,
   c) a description of the methods used in determining (a) and (b) above (e.g., material balance, volumetric analysis, model study, a comparison of analog pools), and

If there are sufficient pressure, production, and PVT data, a material balance evaluation should be done and compared to the volumetric results.

Failure to provide the calculation methods and supporting data will delay processing of your application.

It is not necessary to provide production plots for the wells, except to illustrate a particular point or issue (e.g., decline analysis, specific well performance issues).

d) the supporting data used in determining (a) and (b) above and the sources of the data (e.g., pressure/volume/temperature [PVT] properties and source, pressure data and source).

Unit 3 Production Control

3.1 Commingled Production

3.1.1 Background

Commingled production occurs when two or more pools are produced without segregation in the wellbore. Commingled production is regulated in accordance with sections 3.050 and 3.060 of the *Oil and Gas Conservation Rules* (*OGCR*).

Segregation of production in the wellbore is regulated to

- avoid wellbore and/or reservoir conditions that may adversely affect resource recovery,
- maintain the ability to gather data on an individual-pool basis for resource evaluation and reservoir management,
- ensure operational safety, and
- ensure the protection of nonsaline groundwater.

While these reasons for segregated production remain valid, commingling of production from multiple pools in the wellbore following approval by the AER is a longstanding practice in Alberta that has occurred over a wide range of formations and depths. The AER recognizes that commingling maximizes conservation in many cases and is necessary for economic and orderly development of lower productivity resources.

Sections 3.1.5 and 3.1.6 of *Directive 065* allow commingling to occur without an application being filed or an AER approval being issued if the associated risk is low and specific requirements are met. For higher risk situations, if the commingling of production from two or more pools in the wellbore is desired, an application for approval to commingle must be submitted to the AER in accordance with section 3.1.8 of *Directive 065*.

3.1.2 Processes for the Management of Commingled Production

Three processes exist for the management of commingled production in the wellbore:

- development entity (DE),
- self-declared (SD) commingling, and
- approval of an application in accordance with *Directive 065*.

If the proposed commingling does not meet the requirements for commingling through the DE or SD process, the licensee must obtain approval for the commingling through the application process (figure 3.1 in section 3.1.4).

3.1.3 AER Expectations, Notification Requirements, and Compliance Assurance for All Commingled Production

3.1.3.1 Commingled Operations

The AER expects licensees to use good engineering practices when commingling production. This includes

- a good understanding of the reservoir and fluid properties prior to commingling;
- the collection of the appropriate reservoir data necessary to accurately assess and properly manage the reservoirs—this may exceed the minimum requirements prescribed by the AER; and
- review of all commingled wells and pools on an ongoing basis to ensure continued adherence to the requirements that originally supported the onset of commingled production.

Licensees must comply with all requirements set out in this directive and submit any additional data collected for reservoir management in accordance with section 11.005 of the *OGCR*.

The AER supports the water management objectives of Alberta's *Water for Life: Alberta's Strategy for Sustainability* and stresses that a licensee must meet the requirements in *Directive 035: Baseline Water Well Testing Requirement for Coalbed Methane Wells Completed Above the Base of Groundwater Protection* and *Directive 044: Requirements for the Surveillance, Sampling, and Analysis of Water Production in Hydrocarbon Wells Completed Above the Base of Groundwater Protection*.

3.1.3.2 Reporting and Administration of Commingled Production

The licensee must identify the process used to commingle production by selecting the appropriate item on the Petroleum Information Network (PETRINEX) drop-down list entitled "Commingling Process." The licensee must also update the commingling process in the event

- corrections to historical misuse of commingling process are required,
- a well no longer meets DE or SD commingling decisional tree criteria and commingling approval is reflected on a commingling (MU) order, or
- wellbore configurations have been changed (e.g., segregation or additional perforations expanding the completed interval).

The temporary commingled code 999660 (TMP CMGL CODE) should be chosen when reporting commingled production for the first time regardless of the commingling process used. The DE and SD commingling codes will remain on the drop-down pool code listing for AER administration; however, these codes should not be selected to report commingled production.

The AER will evaluate all wells for which production is initially reported with a temporary commingled pool code. A commingled production code based on the geological evaluation of the pools completed in the well will then be assigned to the production by the AER to replace the temporary code for that well on the PETRINEX. However, where the DE or SD process has been used, the creation of this new commingled pool code does not imply that other wells completed in the same pool(s) in the future may be commingled without further process. Each new well in which commingling is proposed through the DE or SD process must meet the DE or SD requirements, and production from the well must be reported to the PETRINEX initially using the temporary commingled pool code.

3.1.3.3 Data Collection

Data collection requirements associated with commingling under the various processes is set out in sections 7.025, 11.005, 11.070, 11.102, and 11.140 of the *OGCR* and in *Directive 040*.

The data collection requirements for gas production from coals and shales are set out in sections 11.005, 11.040, 11.070, 11.102, 11.140, and 11.145 of the *OGCR* and in *Directive 040*. Section 7.025 of the *OGCR* requires control wells for gas production from coals and shales. These control well requirements must be met by all licensees that have gas production from coals or shales.

3.1.3.4 Compliance Assurance

The AER has substantially strengthened its surveillance, audit, and enforcement processes to ensure that it is more effective in identifying and dealing with potential unauthorized commingling and other related noncompliant situations. Any noncompliance with commingled production requirements may result in a regulatory response from the AER.

The AER believes that it is prudent for licensees to proactively review their wells to ensure that all production operations are in compliance with the regulations and *Directive 065*. Licensees should disclose any instances of unauthorized commingling to ResourceCompliance@aer.ca.

The decision tree criteria for DE and SD commingling processes must be met for the life of the commingled stream. Licensees must review wells previously commingled using the DE and SD processes to ensure that the wells continue to meet the decision tree criteria.

In some compliance situations, pool designation may be an issue. The operator or licensee, as defined in the *Oil and Gas Conservation Act*, must comply with the current AER pool designation. If the licensee wishes to present an alternative pool interpretation, it is expected to provide a technically sound assessment with supporting details.

Current AER pool designation information may be found on the official site for AER Field and Pool Orders at AER Home : Data & Publications : Orders : AER Order System. Field and pool orders are updated monthly.

Further information about pool designations can be obtained by contacting the AER by telephone at 403-297-8311 (Customer Contact Centre) or by e-mail at PoolDesignation@aer.ca.

If there are questions regarding pool interpretations in a compliance situation, the AER will notify the licensee directly in writing. The licensee will have an opportunity to respond to new evidence or rulings on complex or unclear situations in four ways. The licensee may

- qualify to use the DE or SD process described in this section to restore compliance,
- segregate pools in the well,
- submit a complete commingling application under *Directive 065* requirements to restore compliance, or
- submit a technically supported pool delineation application in accordance with *Directive 065*.

Failure to respond within the specified timeframe to an AER request regarding noncompliance or pool delineation issues results in a regulatory response.

3.1.3.5 Notification Requirements for Commingling

A) Notice of Commingling When Using the DE or SD Process

There are no notification requirements associated with the DE or SD commingling processes.

Information on wells that are producing using the DE and SD commingling processes can be obtained by reviewing the list of wells located on the AER website, www.aer.ca, under Data & Publications : Orders : Commingling Orders. This list is updated daily.

As production without segregation in the wellbore may occur only from pools or zones that have common ownership within the drilling spacing unit, all ownership matters must be resolved before any commingling occurs. The licensee of the well in which commingling is occurring under the DE or SD process must also address any concerns that have been raised by Freehold mineral owners or licensees of wells offsetting the drilling spacing unit involved. The AER will continue to accept submissions from parties that have concerns about whether DE or SD commingling should have occurred, as noted in section 3.1.7.

Refer to the Explanatory Notes in section 3.1.7(7) for information on off-target well issues that may be raised for wells with production commingled using the DE or SD process and disputes regarding DE and SD commingling.

B) Notice of Commingling When Using the Application Process

Notification when using the application process must be conducted in accordance with table 3.1. The applicant may be required to complete the notification requirements in more than one of the categories depending on the circumstances. The applicant must provide a minimum response period of 15 working days from the date the notification letter is mailed. The response period must be complete for all parties notified prior to the application for commingling being filed with the AER. Consent from notified parties is not required. However, the AER expects applicants to engage in meaningful discussions with any stakeholder that has raised concerns or questions. The AER expects that applicants will make reasonable efforts to resolve matters prior to filing an application.

Table 3.1 Notification requirements for commingling applications

If you are applying for commingling because	You must send notice of the proposed commingling at minimum to
1) the proposed commingling is for a situation where • there is actual or anticipated water production equal to or greater than 30 m^3/month in a well with perforations above the base of groundwater protection (BGWP), or • there are unresolved equity issues with respect to the proposed commingling.	• well licensees of nonabandoned wells in the standard[1] DSU where the subject well is located and in the eight standard DSUs offsetting the subject well, and • Freehold lessors in the standard DSU where the subject well is located and in the eight standard DSUs offsetting the subject well.
2) the proposed commingling is for a situation where • the reservoir pressure of a pool or interval proposed for commingling exceeds 90 per cent of the lesser of the closure or breakdown fracture pressure of one of the other pools or intervals proposed for commingling, or • the well is in a designated oil sands area or is in a pool overlapping a designated oil sands area.	• well licensees of nonabandoned wells in the area of the smaller of the pools proposed for commingling and in the standard DSUs offsetting the smaller of the pools,[2] or if the smaller pool is a single-well pool, in the standard DSU where the subject well is located and in the eight standard DSUs offsetting the subject well, and • Freehold lessors in the area of the smaller of the pools proposed for commingling and in the standard DSUs offsetting the smaller of the pools, or if the smaller pool is a single-well pool, in the standard DSU where the subject well is located and in the eight standard DSUs offsetting the subject well.
3) the proposed commingling is for a situation where • the commingled stream contains H_2S, • the commingled stream contains oil, associated gas, and/or nonassociated gas, • there are two or more oil pools with production greater than 3 m^3/day from any well in any pool, • there is a pool(s) subject to an existing or proposed enhanced recovery scheme, or • commingling of production would address an operational issue not specifically detailed in this directive.	• well licensees of nonabandoned wells in the pools proposed for commingling,[3] and • Freehold lessors in the area of the smaller of the pools proposed for commingling and in the standard DSUs offsetting the smaller of the pools, or if the smaller pool is a single-well pool, in the standard DSU where the subject well is located and in the eight standard DSUs offsetting the subject well.
4) the proposed commingling is for an area.	• well licensees of nonabandoned wells in the area of application and in the standard DSUs offsetting the area of application, and • Freehold lessors in the area of application and in the standard DSUs offsetting the area of application.

[1] For a gas well, a standard DSU is one section; for an oil well, a standard DSU is one quarter section. If the proposed commingling mixes oil and gas, notice must be provided for the larger DSU involved.

[2] Area of pool as defined by AER, or if the AER has not defined the pool when the notice is provided, the area of the pool as interpreted by the applicant. The AER may request the applicant to provide notice to additional parties if during the evaluation of the application the AER interprets the pool area to be larger than interpreted by the applicant.

[3] If a pool involved is extremely large, the applicant must make a judgement as to what area of the pool should be covered in the notification. This judgement would involve an assessment of which parties might be impacted by the proposed commingling. The AER may request the applicant to provide notice to additional parties if the AER considers that insufficient notice was provided.

3.1.4 Determination of Commingling Process to Use

A determination of which commingling process to use—DE, SD, or the application process—can be made using the decision tree in figure 3.1.

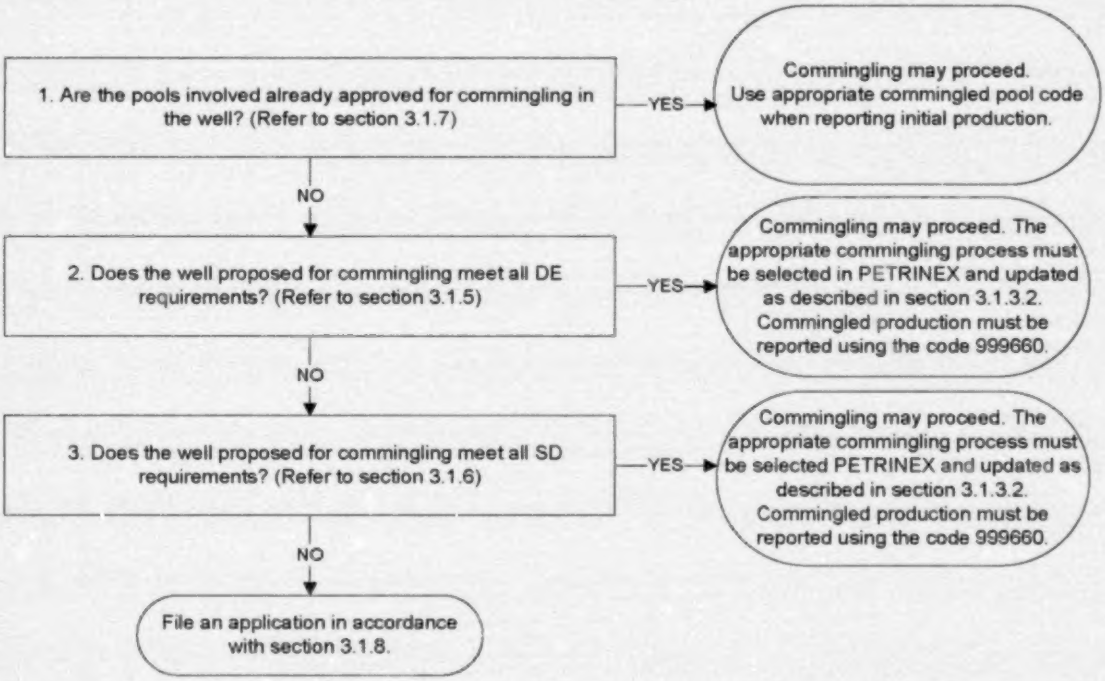

1. Are the pools involved already approved for commingling in the well? (Refer to section 3.1.7)
YES
Commingling may proceed. Use appropriate commingled pool code when reporting initial production.
NO
2. Does the well proposed for commingling meet all DE requirements? (Refer to section 3.1.5)
YES
Commingling may proceed. The appropriate commingling process must be selected in PETRINEX and updated as described in section 3.1.3.2. Commingled production must be reported using the code 999660.
NO
3. Does the well proposed for commingling meet all SD requirements? (Refer to section 3.1.6)
YES
Commingling may proceed. The appropriate commingling process must be selected PETRINEX and updated as described in section 3.1.3.2. Commingled production must be reported using the code 999660.
NO
File an application in accordance with section 3.1.8.

Figure 3.1 Decision tree to determine process to commingle production

3.1.5 Unsegregated Gas Production Within a DE

A DE is an AER-defined entity consisting of multiple stacked formations in a specific area where there is an adequate understanding of the resources to allow commingled production of these formations to be the standard development practice. The AER has established DEs where commingled production of multiple pools over a large area is already occurring and there is minimal risk that unsegregated production will negatively affect conservation or the environment. A DE is administered as a single commingled pool by the AER, although individual formation-based contributing pools within the DE will be identified on the AER order system. AER Orders No. DE 2006-1 and DE 2006-2 show the geographic area and stratigraphic intervals for the two DEs that have been established. These orders are available on the AER website, www.aer.ca, under Data & Publications : Orders : Commingling Orders.

If a licensee meets the requirements set out in section 3.051(1) of the *OGCR* and in this unit, unsegregated gas production from a DE may commence at a well without an application being filed or an AER approval being issued. Each well commingled in a DE must meet all DE requirements for the life of the commingled stream. The DE commingling process can be used for unsegregated production only and does not apply to non-producing wellbores. That is, a well that has been identified as using the DE process for commingling cannot be initially completed and left with pools unsegregated in the wellbore without production commencing. Licensees must identify the well as using the DE commingling process, in accordance with section 3.1.3.2 of this directive; any unsegregated production must be reported using the temporary pool code 999660.

Data requirements for wells with production commingled in the wellbore under the DE process include those set out in sections 11.005, 11.070, 11.102, and 11.140 of the *OGCR* and in *Directive 040: Pressure and Deliverability Testing Oil and Gas Wells—Minimum Requirements and Recommended Practices*.

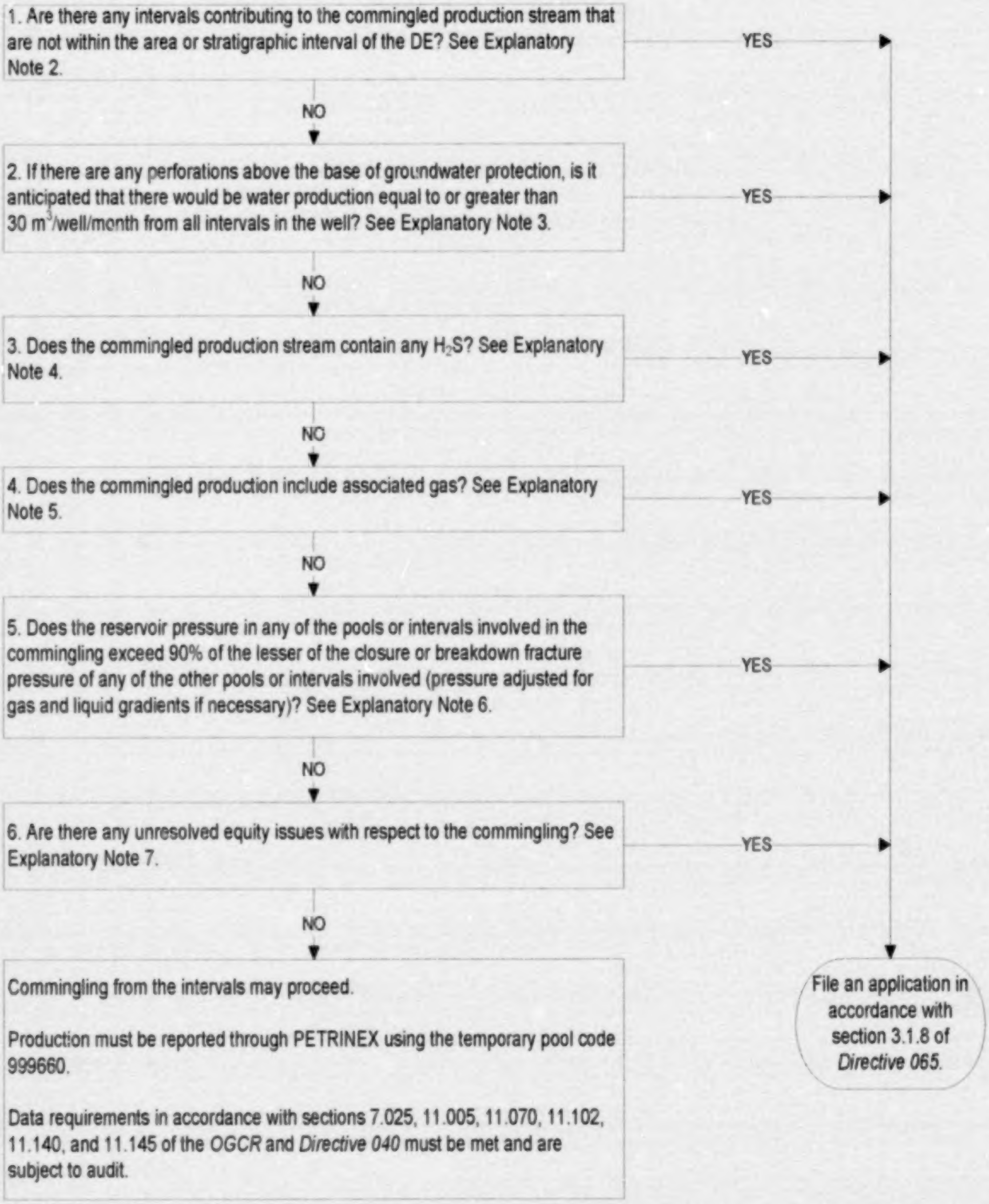
The data collection requirements for gas production from coals and shales are set out in sections 11.005, 11.040, 11.070, 11.102, 11.140, and 11.145 of the OGCR and in *Directive 040*. Section 7.025 of the *OGCR* requires control wells for the production of coalbed methane (CBM) and shale gas. These control well requirements must be met by all licensees that have gas production from coals or shales.

3.1.5.1 Requirements for Commingling of Gas Production in a DE

The following are the specific requirements set out in section 3.051(1) of the *OGCR* that must be met before **nonassociated gas** production may be undertaken without segregation in the wellbore under the DE process:

1) There are no unsegregated completions above or below the stratigraphic interval of the DE.
2) Anticipated or actual water production is less than 30 m^3/month if there are completions above the base of the BGWP.
3) There is no H_2S in the production stream.
4) The licensee has resolved any concerns of lessors or lessees of the mineral rights whose rights may be directly and adversely affected by the unsegregated production.
5) The reservoir pressure of any interval completed for production does not exceed 90 per cent of the fracture pressure of any other interval completed for production.
6) There is no production of gas associated with an oil accumulation.

For additional information, refer to the decision tree in figure 3.2 and the explanatory notes in section 3.1.7.



1. Are there any intervals contributing to the commingled production stream that are not within the area or stratigraphic interval of the DE? See Explanatory Note 2.

2. If there are any perforations above the base of groundwater protection, is it anticipated that there would be water production equal to or greater than 30 m^3/well/month from all intervals in the well? See Explanatory Note 3.

3. Does the commingled production stream contain any H_2S? See Explanatory Note 4.

4. Does the commingled production include associated gas? See Explanatory Note 5.

5. Does the reservoir pressure in any of the pools or intervals involved in the commingling exceed 90% of the lesser of the closure or breakdown fracture pressure of any of the other pools or intervals involved (pressure adjusted for gas and liquid gradients if necessary)? See Explanatory Note 6.

6. Are there any unresolved equity issues with respect to the commingling? See Explanatory Note 7.

Commingling from the intervals may proceed.

Production must be reported through PETRINEX using the temporary pool code 999660.

Data requirements in accordance with sections 7.025, 11.005, 11.070, 11.102, 11.140, and 11.145 of the *OGCR* and *Directive 040* must be met and are subject to audit.

File an application in accordance with section 3.1.8 of *Directive 065*.

Figure 3.2 **Decision tree for the commingling of gas production from intervals within a development entity (DE)**

3.1.6 SD Unsegregated Production

If a licensee meets the requirements set out in sections 3.051(2) and (3) of the *OGCR* and in this unit, unsegregated gas production may commence using the SD process without an application being filed or an AER approval being issued. Each well commingled using this process must meet all SD requirements for the life of the commingled stream. The SD commingling process can be used for unsegregated production only and does not apply to non-producing wellbores. That is, a well that has been identified as using the SD process for commingling cannot be initially completed and left with pools unsegregated in the wellbore without production commencing. Licensees must identify the well as using the SD oil or SD gas commingling process, in accordance with section 3.1.3.2 of this directive; any unsegregated production must be reported using the temporary pool code 999660.

The SD process is for commingling of production from gas pools only or oil pools only. Commingled production from gas and oil pools in the same wellbore is not permitted under this process and requires a commingling application. The SD commingling process has limited applicability with respect to oil production at present, being available for use with only very low-rate oil wells. Also, the SD process may not be used if the proposed commingling involves any H_2S, or wells in a designated oil sands area or in a pool that overlaps into a designated oil sands area.

Production from a well completed within a DE may be commingled with production from intervals above or below the stratigraphic intervals of the DE using the SD process, provided that all requirements for SD commingling are met.

Data collection requirements associated with commingling under the SD process are set out in sections 11.005, 11.070, 11.102, and 11.140 of the *OGCR* and in *Directive 040*. The SD commingling process is the same for all situations, but well testing requirements vary for gas wells depending on the well flow rate, as set out in *Directive 040*.

3.1.6.1 Requirements for SD Commingling of Gas Production

The following are the specific requirements set out in section 3.051(2) of the *OGCR* that must be met before *nonassociated gas* production may be undertaken without segregation in the wellbore under the SD process:

1) Anticipated or actual water production is less than 30 m^3/month if there are completions above the base of the groundwater protection.

2) There is no H_2S in the production stream.

3) The licensee has resolved any concerns of lessors or lessees of the mineral rights whose rights may be directly and adversely affected by the unsegregated production.

4) The reservoir pressure of any interval completed for production does not exceed 90 per cent of the fracture pressure of any other interval completed for production.

5) There is no production of gas associated with an oil accumulation.

6) The well is not in a designated oil sands area or in a pool that overlaps a designated oil sands area.

7) The pools or intervals are not subject to any existing or proposed enhanced recovery scheme.

For additional information, refer to the decision tree in figure 3.3 and the explanatory notes in section 3.1.7.

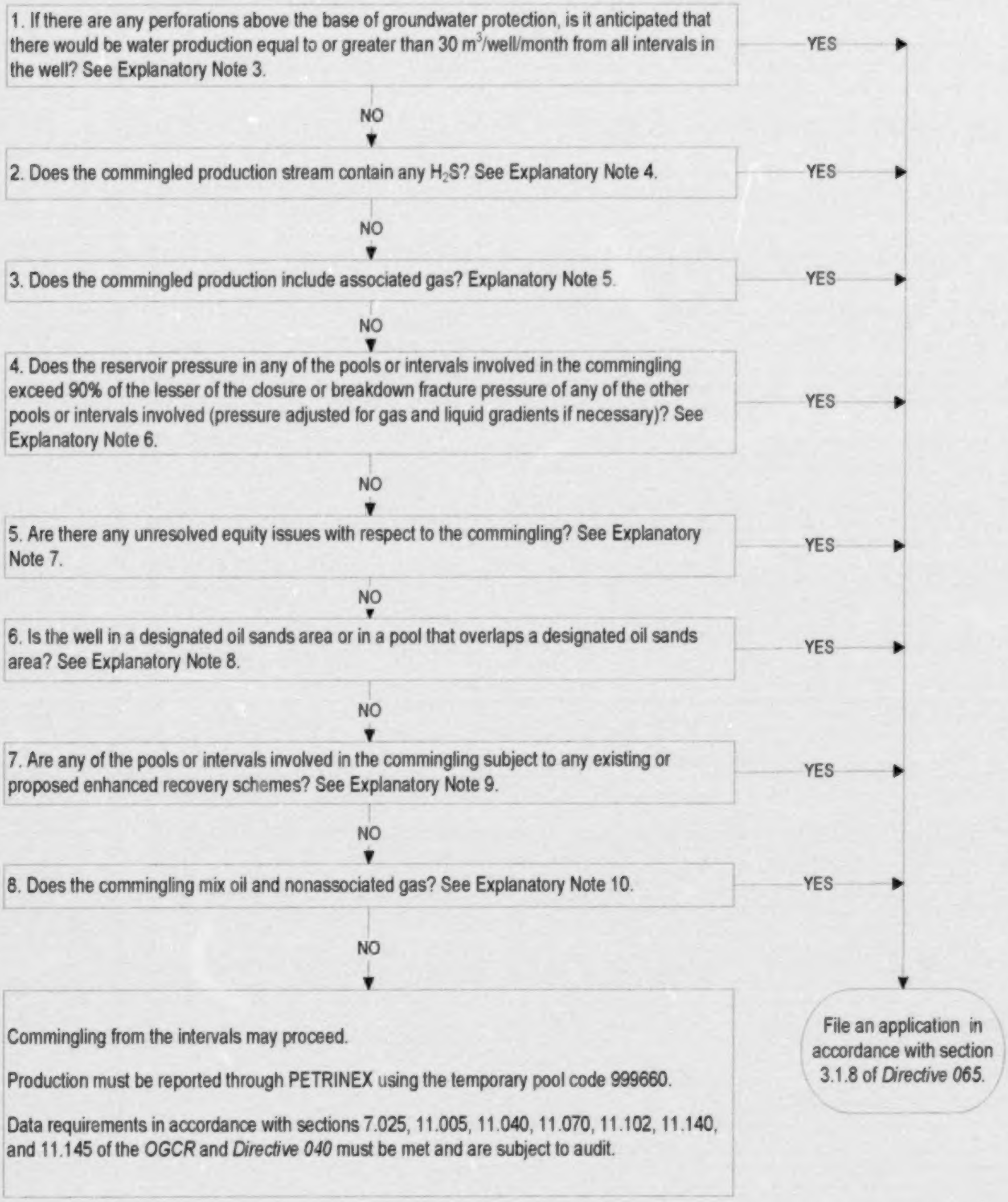

1. If there are any perforations above the base of groundwater protection, is it anticipated that there would be water production equal to or greater than 30 m^3/well/month from all intervals in the well? See Explanatory Note 3.
YES
NO
2. Does the commingled production stream contain any H_2S? See Explanatory Note 4.
YES
NO
3. Does the commingled production include associated gas? Explanatory Note 5.
YES
NO
4. Does the reservoir pressure in any of the pools or intervals involved in the commingling exceed 90% of the lesser of the closure or breakdown fracture pressure of any of the other pools or intervals involved (pressure adjusted for gas and liquid gradients if necessary)? See Explanatory Note 6.
YES
NO
5. Are there any unresolved equity issues with respect to the commingling? See Explanatory Note 7.
YES
NO
6. Is the well in a designated oil sands area or in a pool that overlaps a designated oil sands area? See Explanatory Note 8.
YES
NO
7. Are any of the pools or intervals involved in the commingling subject to any existing or proposed enhanced recovery schemes? See Explanatory Note 9.
YES
NO
8. Does the commingling mix oil and nonassociated gas? See Explanatory Note 10.
YES
NO
Commingling from the intervals may proceed.
Production must be reported through PETRINEX using the temporary pool code 999660.
Data requirements in accordance with sections 7.025, 11.005, 11.040, 11.070, 11.102, 11.140, and 11.145 of the *OGCR* and *Directive 040* must be met and are subject to audit.
File an application in accordance with section 3.1.8 of *Directive 065*.

Figure 3.3 Decision tree to determine if the proposed commingling is a candidate for self-declared gas commingling in a well

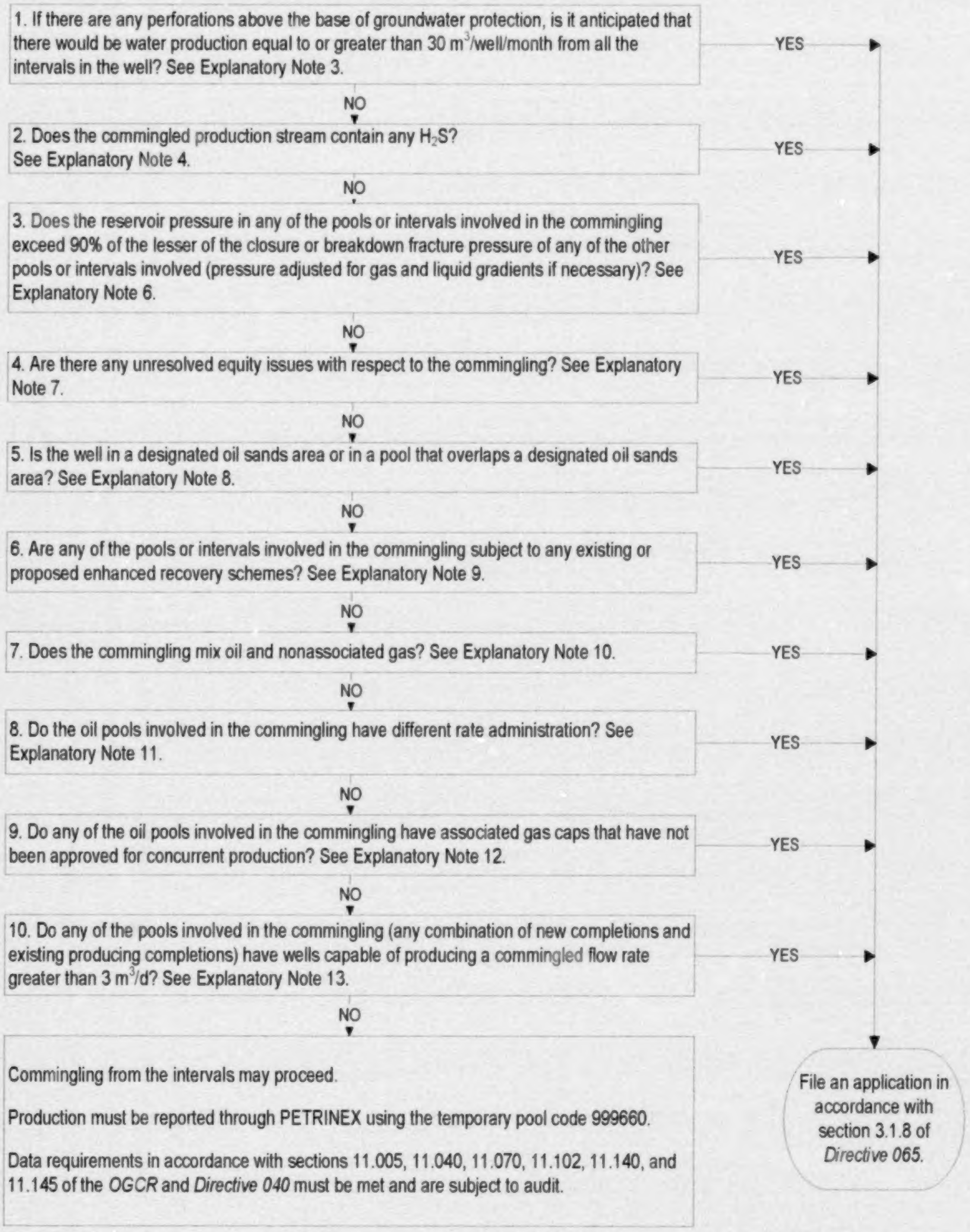
3.1.6.2 Requirements for SD Commingling of Oil Production

The SD commingling process has limited applicability with respect to oil production at present, being available for use with only low rate oil wells. Also, while the commingling of oil production under the SD process is on a well-by-well basis, as it is for all SD commingling, the production rate of all other oil wells in the pools involved with the SD commingling must be taken into consideration, as noted in requirement 10 below, prior to proceeding with using the SD process for the commingling of oil production. This measure is in effect to ensure that resource conservation issues associated with higher productivity oil pools are considered through an application in accordance with section 3.1.7 prior to commingling commencing in the pools.

A licensee must meet the following requirements set out in section 3.051(3) of the *OGCR* before oil production may be undertaken without segregation in the wellbore under the SD process:

1) Anticipated or actual water production is less than 30 m^3/month if there are completions above the BGWP.
2) There is no H_2S in the production stream.
3) The licensee has resolved any concerns of lessors or lessees of the mineral rights whose rights may be directly and adversely affected by the unsegregated production.
4) The reservoir pressure of any interval completed for production does not exceed 90 per cent of the fracture pressure of any other interval completed for production.
5) The well is not in a designated oil sands area or in a pool that overlaps a designated oil sands area.
6) The pools or intervals are not subject to any existing or proposed enhanced recovery scheme.
7) There is no production of gas that is not associated with an oil accumulation.
8) The oil pools have the same rate administration.
9) There are no oil pools that have associated gas caps that have not been approved for concurrent production.
10) The unsegregated flow rate of every well in the pools proposed for commingling is less than 3 m^3/day when calculated over three consecutive months of production.
    - [Total production for 3 consecutive months] ÷ [Total hours on production during those 3 months] × [24 hours/day] must be less than 3.0 m^3/operating day, **and** the flow rate of each well in the pools involved with the SD commingling must also be less than 3.0 m^3/operating day when calculated in the same manner.

For additional information, refer to the decision tree in figure 3.4 and the explanatory notes in section 3.1.7.



1. If there are any perforations above the base of groundwater protection, is it anticipated that there would be water production equal to or greater than 30 m^3/well/month from all the intervals in the well? See Explanatory Note 3.

2. Does the commingled production stream contain any H_2S? See Explanatory Note 4.

3. Does the reservoir pressure in any of the pools or intervals involved in the commingling exceed 90% of the lesser of the closure or breakdown fracture pressure of any of the other pools or intervals involved (pressure adjusted for gas and liquid gradients if necessary)? See Explanatory Note 6.

4. Are there any unresolved equity issues with respect to the commingling? See Explanatory Note 7.

5. Is the well in a designated oil sands area or in a pool that overlaps a designated oil sands area? See Explanatory Note 8.

6. Are any of the pools or intervals involved in the commingling subject to any existing or proposed enhanced recovery schemes? See Explanatory Note 9.

7. Does the commingling mix oil and nonassociated gas? See Explanatory Note 10.

8. Do the oil pools involved in the commingling have different rate administration? See Explanatory Note 11.

9. Do any of the oil pools involved in the commingling have associated gas caps that have not been approved for concurrent production? See Explanatory Note 12.

10. Do any of the pools involved in the commingling (any combination of new completions and existing producing completions) have wells capable of producing a commingled flow rate greater than 3 m^3/d? See Explanatory Note 13.

Commingling from the intervals may proceed.

Production must be reported through PETRINEX using the temporary pool code 999660.

Data requirements in accordance with sections 11.005, 11.040, 11.070, 11.102, 11.140, and 11.145 of the *OGCR* and *Directive 040* must be met and are subject to audit.

File an application in accordance with section 3.1.8 of *Directive 065*.

Figure 3.4 **Decision tree to determine if the proposed commingling is a candidate for self-declared oil commingling in a well**

3.1.7 Explanatory Notes to Determine if the DE or SD Processes May Be Used

1) Are the pools involved already approved for commingling in the well?

To answer this question, the list of pools approved for commingling, as identified in the field-based MU orders, must be checked. An evaluation needs to be made as to whether each productive interval in the well proposed for commingling is currently part of an existing pool as defined by the AER. If each interval proposed for commingling is within the boundaries of existing pools as defined at the time the licensee is conducting its evaluation and these pools are already approved for commingling, production from the pools may be commingled in the subject well without any notice to the AER. Commingled production must be reported to the PETRINEX using the existing commingled production code for the pools involved.

If at the time of the evaluation, the pools in the well have not been approved for commingling as set out in the field-based MU orders, the licensee may proceed to use the DE or SD decision tree to determine whether the well is a candidate for commingling through the DE or SD process. If the well is a candidate for commingling using the DE or SD process, production may be commingled in the wellbore immediately. Commingled production must initially be reported to the PETRINEX using the temporary commingled pool code 999660 for each field, and the licensee must operate within the DE and SD criteria at all times. If the proposed commingling does not meet the criteria for either DE or SD commingling and commingling is desired, an application in accordance with section 3.1.8 of *Directive 065* must be submitted.

2) Are there any intervals contributing to the commingled production stream that are not within the area or stratigraphic interval of the DE?

To answer this question, the licensee must confirm if the well and intervals proposed for commingling are within the area and stratigraphic interval of the related DE. This information is provided on the order for each DE, which is available on the AER website, www.aer.ca, under Data & Publications : Orders : Commingling Orders. If the well is outside the area of the DE or there are any perforated intervals within the wellbore that are outside the stratigraphic interval of the DE, the well is not permitted to commingle production under the DE process. If commingling of production is desired in this circumstance, the licensee may proceed to the SD decision tree and determine if the proposed commingling meets the criteria for SD commingling. If the proposed commingling does not meet the criteria for either DE or SD commingling and commingling is desired, an application in accordance with section 3.1.8 of *Directive 065* must be submitted.

3) *If there are any perforations above the BGWP, is it anticipated that there would be water production equal to or greater than 30 m^3/well/month from all intervals in the well?*

A licensee may determine whether any interval proposed for commingling is above BGWP from the data provided in AER *ST55: Alberta's Base of Groundwater Protection (BGWP) Information*.

The volume of 30 m^3/well/month is proposed as a practical cutoff to allow for small volumes of water, including water of condensation that may periodically need to be cleaned out of the well.

If it is anticipated that water volumes equal to or greater than 30 m^3/well/month could be produced from any or all intervals in the well that has perforations above the BGWP, a licensee may not commingle production using the DE or SD process. If the well begins to produce equal to or greater than 30 m^3/well/month after the commencement of commingled production, the licensee must immediately self-disclose to the AER (see section 3.1.3.4).

If an existing well that is to be recompleted for commingled production has produced greater than 30 m^3/well/month of water from the well in any of the last 12 months, a licensee may not commingle production using the DE or SD process.

If the licensee wishes to commingle production in this circumstance, an application in accordance with section 3.1.8 of *Directive 065* must be submitted. The application must provide a case that water produced with commingled production will not contaminate groundwater or adversely impact the recovery of gas from coals. Licensees should note that commingling of production in wells with completions above the BGWP that have actual or anticipated water production equal to or greater than 30 m^3/month conflicts with *Directive 044*.

Licensees must also ensure that operations comply with the *Water Act* taking particular note that non-saline water may not be produced without a groundwater diversion permit, non-saline aquifers may not be mixed, and saline and non-saline aquifers may not be mixed.

4) *Does the commingled production stream contain any H_2S?*

Gas or oil with any H_2S content greater than 0.00 mole/kilomole is considered to contain H_2S. This is consistent with table 7.1 in *Directive 056: Energy Development Applications and Schedules*.

A licensee may not commingle gas or oil production containing H_2S using the DE or SD process. If commingling of production is desired in this situation, an application in accordance with section 3.1.8 of *Directive 065* must be submitted. If H_2S is detected subsequent to the commencement of DE or SD commingling, the decisional tree criteria are no longer being met and **licensees must immediately self-disclose to the AER**.

5) Does the commingled production include associated gas?

Commingling of associated gas and nonassociated gas may not occur using the DE or SD (gas) process. If the licensee wishes to commingle any nonassociated gas with associated gas, an application in accordance with section 3.1.8 of *Directive 065* must be submitted.

6) Does the reservoir pressure in any of the pools or intervals involved in the commingling exceed 90 per cent of the lesser of the closure or breakdown fracture pressure of any of the other pools or intervals involved (pressure adjusted for gas and liquid gradients if necessary)?

Closure pressure is the pressure needed to open and/or extend a fracture resulting from previous stimulation operations. Breakdown pressure is the pressure needed to initially fracture a reservoir during stimulation operations.

Having extreme pressure differences between pools proposed for commingling raises a safety issue in that wellbore control may be jeopardized if fluid from a high-pressured reservoir flows into a lower-pressured reservoir that has a well completion or wellhead equipment not designed for such high pressures. Another concern about the commingling of production from pools with extreme pressure differences arises when a new well is drilled into a pool that has an unusually high pressure due to cross-flow from a commingled completion; this raises a safety issue in that the party drilling nearby may not anticipate the higher pressure.

The onus is on the licensee to evaluate this issue. If the reservoir pressure in any of the pools proposed for commingling exceeds 90 per cent of the lesser of the closure or breakdown fracture pressure in any other pools proposed for commingling (with pressure adjusted for gas and liquid gradients in the wellbore if necessary), a licensee may not commingle gas in the wellbore without the specific approval of the AER through an application filed in accordance with section 3.1.8 of *Directive 065*. Any application requesting approval for commingling in this situation must show that the pools involved will be isolated during any shut-in periods and that casing and cement integrity and wellhead design are adequate for the proposed completion.

7) Are there any unresolved equity issues with respect to the commingling?

Although there are no notification requirements associated with the DE and SD processes, well licensees must ensure that there is common ownership within a drilling spacing unit before any production occurs. Licensees should also be aware that well spacing may not be the same for all zones.

Licensees using the DE and SD commingling processes in off-target wells should also be aware that commingling may be an issue because commingling will affect the licensee's ability to obtain segregated pool data, which in turn may adversely affect the ability of offsetting licensees to determine the possible effects of the off-target well. For example, the offsetting licensee may not be able to adequately judge whether the off-target well is in the same pool as the offsetting licensee's well because of a lack of segregated pool data.

If a licensee is considering drilling an off-target well and is also considering commingling production in the wellbore from the onset, it is recommended that the licensee determine in advance whether such commingling is likely to be an issue with any offsetting mineral holder with a wellbore, so that the question on equity on the decision trees can be adequately answered.

If there is commingling in an off-target well and subsequently a dispute arises respecting the off-target well, the AER may require the licensee to segregate production from the pools in question so that data can be obtained to resolve the dispute.

If a party has a concern as to whether the commingling should have occurred, it must contact the licensee of the well in which the commingling is occurring. The parties should attempt to resolve the issue through negotiation, appropriate dispute resolution, and other mutually acceptable means. If the dispute is not resolved, either party may contact the AER for resolution. After review of the matter, the AER may require that production in the well under dispute be segregated.

Although it would normally be expected that any concerns raised regarding commingling would be brought forward by Freehold mineral lessors or licensees with an interest in the drilling spacing unit where commingling is to occur or in an adjacent drilling spacing unit, concerns raised by parties outside of that area must also be addressed. If the AER were asked to make a decision in such a case, it would consider the arguments brought forward on their own merits and would not automatically reject the concerns raised solely due to the location of the objecting party's interests.

8) *Is the well in a designated oil sands area or in a pool that overlaps a designated oil sands area?*

The licensee must check AER Orders No. OSA 1, OSA 2, and OSA 3 showing designated oil sands areas and strata. These orders are available on the AER website, www.aer.ca, and from AER Information Services. Because the issue of gas production in oil sands areas can be complex and the optimum processes for dealing with the production of gas reservoirs in contact with bitumen reserves have not been determined, wells in this area are not candidates for SD commingling. If approval to commingle gas production in a designated oil sands area or from any pool that overlaps a designated oil sands area is desired, an application in accordance with section 3.1.8 of *Directive 065* must be submitted.

9) *Are any of the pools or intervals involved in the commingling subject to any existing or proposed enhanced recovery scheme?*

Conservation may be jeopardized if any pool proposed for commingling is part of an enhanced recovery scheme. The lack of segregation could result in operational difficulties and the loss of data required to properly manage the scheme. In this situation, SD commingling may not occur. If approval to commingle production is desired, an application in accordance with section 3.1.8 of *Directive 065* must be submitted.

10) Does the commingling mix oil and nonassociated gas?

Conservation of oil may be jeopardized if there is commingling of oil and nonassociated gas. The lack of segregation could make it difficult to determine if the oil pool is a candidate for enhanced recovery. In this situation, SD commingling may not occur. If approval to commingle is desired, an application in accordance with section 3.1.8 of *Directive 065* must be submitted.

11) Do the oil pools involved in the commingling have the same rate administration?

Oil pools proposed for commingling must have a common rate administration. This means that all pools have been approved for good production practice (GPP) or, alternatively, that all wells in the pools are subject to a maximum rate limitation (MRL). The MRLs can be different for the wells.

If commingling is desired for pools with different rate administration, the well licensee's first step must be to file an application requesting the same rate administration for all pools involved (i.e., all pools are either approved for GPP or all pools are subject to MRL). If the AER approves the application to establish the same rate administration, the well licensee may then review the well(s) and pools involved to determine if commingling may occur under the SD process. If the well(s) and pools still do not meet all the SD criteria and approval to commingle in this situation is still desired, an application in accordance with section 3.1.8 of *Directive 065* must be submitted.

12) Do any of the oil pools involved in the commingling have associated gas caps that have not been approved for concurrent production?

If commingling is desired for any pool with a gas cap that has not been previously approved by the AER for concurrent production, the well licensee's first step must be to file an application requesting approval of the appropriate concurrent production. If the AER approves the application for concurrent production, the well licensee may then review the well(s) and pools involved to determine if commingling may occur under the SD process. If the well(s) and pools still do not meet all the SD criteria and approval to commingle in this situation is still desired, an application in accordance with section 3.1.8 of *Directive 065* must be submitted.

13) Do any of the [oil] pools involved in the commingling (any combination of new completions and existing producing completions) have wells capable of producing a commingled flow rate greater than 3 m^3/day?

Pools that have wells capable of producing a commingled flow greater than 3 m^3/day are considered to be potential enhanced recovery candidates.

For each existing segregated producing oil pool, the rate must be determined while the well is producing in a pumped-off fashion. The rate must be an average of the last three months of production, calculated using operating hours; the three months need not be consecutive, nor is there a minimum time for production in a given month. All wells in the pools must be reviewed to ensure that there are no wells capable of producing a commingled flow rate greater than 3 m^3/day.

For a new oil pool/well, the anticipated production rate must be determined from test data collected from the oil zones in the well.

If approval to commingle in this situation is desired, an application in accordance with section 3.1.8 of *Directive 065* must be submitted

This decisional criterion must be met for the life of the commingled stream. This means that any remedial operations on wells to increase productivity or any expansion of the pool that adds higher productivity wells may place the SD commingled wells in noncompliance (see section 3.1.3.4 of this directive).

3.1.8 Approval to Commingle Production Through an Application

If the proposed commingling does not meet the criteria to allow commingling through the DE or SD processes and is not already approved for the pools in question, the licensee must obtain approval for commingling through the application process. The licensee must file an application in accordance with section 3.050 of the *OGCR* and section 3.1.8 of *Directive 065*. The application may request commingling on a well, pool, or area basis.

For wells, pools, or areas applied for under this process, the intervals applied for commingling must remain segregated until the AER has issued an order approving the application.

In summary, the application process may be used to obtain approval to commingle production in accordance with section 3.050 of the *OGCR* if the proposed commingling is not permitted through the DE or SD process. In addition, applications may be made for area-based commingling; however, area-based applications should only be submitted for areas and strata that do not qualify for the DE or SD process.

3.1.8.1 How to Make a Commingling Application

Applications must be submitted electronically, rather than on paper, using the Electronic Application Submission (EAS) process, accessed through the Digital Data Submission (DDS) screen on the AER website, www.aer.ca. The AER will review all applications to ensure that the requirements for commingling applications have been met. Incomplete applications or those containing significant errors will be closed.

3.1.8.2 How the AER Processes the Application

The AER reviews all commingling applications to ensure that oil and/or gas recovery will be optimized, there will not be any adverse effects from the commingling, safety is maintained, and non-saline groundwater is protected.

The AER will disposition applications electronically, with the disposition being available for viewing through IAR Query for 30 days after the disposition of the application. IAR Query is accessible via the Systems & Tools page on the AER website.

3.1.8.3 Requirements for an Application for Commingled Production on a Well, Pool, or Area Basis

The requirements for all situations where commingling may be desired are numbered and described later in this section. The information required for any specific commingling application will depend on the reasons that the application is being made. Table 3.2 shows the numbered requirements that must be met in each of the situations noted. Depending on the situation, the applicant may be required to choose more than one of the categories and meet the combined requirements in the application.

If the proposed commingling includes gas from coal or shale, an applicant must file an application for approval of commingling on an area basis, rather than for a well or pool-based approval. An area-based approval can include one or more DSUs. Applications should be formatted so that the number of the requirement in table 3.2 corresponds with the numbered discussion in the application.

Table 3.2 Summary of requirements for commingling on a well, pool, or area basis

Reason for filing a commingling application	Requirements for applications
1) There is actual or anticipated water production equal to or greater than 30 m^3/month in a well with perforations above the BGWP.	1, 2(a), 2(b)(i), 3–7, 9, 10–14
2) There is H_2S in the proposed commingled production stream.	1, 2(a), 2(b)(ii), 3, 4, 7–14
3) The proposed commingling is for the commingled stream contains H_2S, • nonassociated and associated gas, • oil and nonassociated gas, • oil, associated gas, and nonassociated gas, or • oil pools (any combination of new completions and existing producing completions) having wells capable of producing a commingled flow rate more than 3 m^3/day.	1, 2(a), 2(b)(iii), 3, 4, 10–14, 17
4) The reservoir pressure of a pool or interval proposed for commingling exceeds 90 per cent of the lesser of the closure or breakdown fracture pressure of one of the other pools or intervals proposed for commingling.	1, 2(a), 2(b)(iv), 3, 4, 10–13, 15
5) There are unresolved equity issues with respect to the proposed commingling.	1, 2(a), 2(b)(vi), 3
6) The well is in a designated oil sands area or is in a pool overlapping a designated oil sands area.	1, 2(a), 3, 4, 10–14, 18
7) A pool proposed for commingling is subject to an existing or proposed enhanced recovery scheme.	1, 2(a), 2(b)(v), 3, 4, 10–14, 16
8) Area-based commingling is desired.	1, 2(a), 2(b)(vi), 3, 4, 7, 10–14, 19
9) Commingling of production would involve an operational issue not specifically detailed in *Directive 065*.	All requirements are to be included in the application. For any requirement not applicable to the situation, the applicant must indicate that the requirement does not apply.

An application for approval to commingle production must include the information for those items as specified in the table above and as described on the following pages.

Requirements	**Comments**
1) A statement of what is being requested, including	
a) a reference that the application is being made under section 3.050 of the *OGCR*, and	
b) if approval for commingling is requested on a well or pool basis, the name of the well(s) and pools that are the subject of the application, together with identification of each productive interval (kelly bushing [KB] elevation, in metres) in each well of interest from which you propose to commingle production, or	If the pools involved have not been defined by the AER at the time of application, the pools should be referred to as undefined. Inclusion of the intervals ensures that there is no confusion about the pools involved, which might occur if the AER and an applicant have different terminology for the same zones.
c) if an area-based commingling approval is being requested, a list of the sections in the area of application and the zones to which the commingling would apply, together with a geophysical log of a type well with annotations identifying the subject zones.	
2) A discussion of the reasons why you are requesting commingling, including, as appropriate,	In general, improved economics with commingling alone or the ability to conduct fewer tests under a commingling approval are not considered valid reasons for an application.
a) a statement of the DE or SD criteria that were not met or the operational issues that would be addressed by commingling, and	
b) justification as to why commingling should be granted, including, where required,	Your discussion of why commingling should be permitted should draw on the information and evaluations included elsewhere in the application.

i) why commingling will not contaminate any non-saline water interval, with supporting technical evaluation as appropriate,

ii) why commingling of the sour gas will not cause problems, including contamination of sweet pool, with supporting technical evaluation,

iii) why commingling will not adversely impact recovery from the oil pool, with supporting technical evaluation,

iv) why the differences in pressure between the pools will not be a safety issue if commingling is permitted, with supporting technical evaluation; provide an explanation of why the higher pressured zone/s cannot be produced first so that the pressure depletion will allow the addition of lower pressured zones at a later date,

v) why the commingling will not adversely impact the operation of the enhanced recovery scheme, with supporting technical evaluation, or

vi) why the commingling will not have any adverse impacts, with supporting technical evaluation.

3) A description of your notice program, including	The parties that must be notified are set out in table 3.1 in section 3.1.3.5.
a) lists of the parties notified,	You must provide a tabulation of Freehold owners and well licensees notified. The tabulation should include the legal land description by DSU for the area of notification and the names of the mineral owner(s), except as noted below, and well licensees contacted for each DSU. The tabulation must not include the names of individual Freehold mineral owners, as this might raise privacy issues. For these persons, the tabulation should specify "Freehold – Individual." You must compile a list of the names, legal description of the land involved, and mailing addresses of all Freehold mineral owners notified and have this information available to the AER on request. As this list contains personal information, it is *not* to be filed upon submitting the application to the AER.
b) evidence of notification, and	Provide a written statement that all of the Freehold mineral owners and well licensees as required by table 3.1 have been notified. Provide an example of the notification letter sent to individual Freehold mineral owners and to well licensees. Do not include any individual's name or contact information in the example of the letter sent to Freehold mineral owners. Do **not** provide copies of any notification letters that were sent unless specifically requested by the AER.

c) summary of notification results.	Provide a statement of the results of your notification program. The AER does not require letters of consent from the parties notified. Do **not** file copies of any consent letters that may have been received unless requested to do so by the AER. You must include the details of unresolved concerns, both written and verbal, in the application filed with the AER. Include a discussion of how you have addressed the unresolved concerns and the outcome you expect from the AER regarding the unresolved concerns. If an unresolved concern is from an individual Freehold mineral owner, do not include the person's name, contact information, or written correspondence. In these cases the person must be identified as "Freehold – Individual" in the application. You must have the name, contact information, and written correspondence from such individuals available to the AER on request. If a substantiated, valid statement of concern is filed that cannot be resolved by the parties involved in a reasonable time, the AER will typically schedule a public hearing to consider the application.
4) If there are perforations above 600 mKB, identification of the base of groundwater protection (BGWP) (mKB).	The BGWP may be obtained from the data provided in AER *ST55-2007: Alberta's Base of Groundwater Protection (BGWP) Information* or from your own analysis. If you have completed your own analysis, you must include the geological and/or technical information to support your pick of the BGWP in the application.

5)	a) Identification of the source (intervals), composition, and volumes of the water, and b) a discussion of how anticipated water production was estimated or how produced water was measured or estimated.	You must conduct sampling and analysis of the water in accordance with *Directive 044*. Well licensees are responsible for ensuring that the volume of water produced from a well is measured accurately.
6)	If the applicant is proposing to produce non-saline water, the number of the water diversion permit that has been obtained from Alberta Environment and Sustainable Resource Development.	The *Water Act* prohibits the production on non-saline water unless such production is approved by a water diversion permit obtained from Alberta Environment and Sustainable Resource Development.
7)	A copy of the fluid analysis for each pool and coal and shale zone proposed for commingling.	
8)	Confirmation that the infrastructure to produce and transport the reservoir fluid is appropriate for the commingled production stream.	
9)	Confirmation that an AER-approved emergency response plan (ERP) incorporating the proposed commingling is in place or, alternatively, a discussion addressing the status of the ERP.	If the proposed commingling will result in an increase in the potential H_2S release volume, the AER must ensure that there is an up-to-date ERP in place prior to its decision on the application. If no up-to-date AER-approved ERP is in place but is required, the applicant must confirm that an application for the updated ERP has been filed directly with the AER Emergency Management Group for review.

	See *Directive 071: Emergency Preparedness and Response Requirements for the Petroleum Industry* for further details on emergency response planning. If you consider that an updated ERP is not required, your discussion must indicate why you believe that is the case.
10) A discussion of the geology of the pools and coal and shale zones involved in the application.	Knowledge of the geological setting for a pool/zone can add insight as to the quality of the pool/zone (for example, a reservoir matrix that would result in poor permeability and/or poor productivity) and the likelihood that the pool/zone may be extensive (e.g., the depositional environment, the trapping mechanism).
11) For all types of reservoirs excluding coal or shale reservoirs, your interpretation of each pool involved in the application, including a) a net pay isopach map of the pool, including both oil and gas if there is an associated pool, b) if pool delineation or fluid interfaces are based on structural interpretation, a structure contour map of the pool and offsetting area, and	You do not have to include net pay isopach maps if the pools are considered to be single well; however, you should explain why the pools are considered to be single-well pools and whether this is based on offset well control and/or engineering data. If the size of the pool is unknown due to poor well control, the AER may consider it premature to approve commingling, unless there are compelling reasons to do so. If pools are larger, not in a stage of advanced depletion, and/or have good deliverability, the AER may consider that segregated production should be maintained to allow for the collection of segregated pool data for the purpose of enhancing pool management to obtain optimum recovery of reserves. You should only include a structural map if it is a key in determining fluid interfaces or pool delineation.

c) a tabulation of the interpreted net pay, porosity, and water saturation for each well in the pool and coal and shale zones and the cutoffs applied.	If you do not supply tabulated well data for all wells in the pools/zones, you must explain why.
12) For all types of reservoirs including coal and shale reservoirs, an interpreted and annotated log cross-section or representative well log(s) showing a) stratigraphic interpretation of the zone(s) of interest, b) interpretation of the fluid interfaces present, c) completions and treatments to the wellbore(s), with dates, d) cumulative production, e) finished drilling date and KB elevation, and f) the scale of the log readings.	For cases involving gas pools, an annotated representative well log is sufficient. If oil pools are involved and the potential for enhanced oil recovery must be addressed, you should include the annotated cross-section.
13) A tabulation of a) the results of deliverability, flow, or production tests on **each** pool and coal and shale zone proposed for commingling in the wells of interest, together with an indication of the type of test involved (e.g., AOFP) and the date of the test, and b) if a well is currently producing, a tabulation summarizing the current productivity of each pool and coal and shale zone in the subject well.	The AER is not prepared to consider requests to approve commingling of production from pools/zones unless those pools/zones are considered to be capable of production. This would at minimum entail flow test data showing that the individual pool/zone is capable of production. (Copies of the actual tests are not required for the application unless specifically requested.) If a well is producing, only a summary of current productivity for each pool/zone in the well involved is required. You should not include the entire production history of the well in the application, unless the production trend is the basis for the request.

	If the productivity of a pool/zone has declined significantly or is low from the outset, the case for commingled production is strengthened in that it can be argued that commingling would allow each pool/zone involved to produce economically for a longer time and thus enhance overall recovery.
14) Initial and current sandface pressure information in accordance with *Directive 040* for each pool and coal and shale zone together with an indication of the type and date of the test or the analysis used to estimate the pressures, and if there are pressure differences between pools and coal and shale zones proposed for commingling, evaluations of	The AER requires current pressure information to adequately evaluate the application. If no individual-pool pressure tests have recently been conducted, current individual-pool pressures should be estimated using best engineering practices.
a) the potential for cross-flow of reservoir fluids between the pools and zones, particularly when the well is shut in, and b) why the pressure differences will not result in any adverse impacts if commingling is permitted.	Pressure differences between pools/zones raises the possibility that commingling of production may result in the cross-flow of reservoir fluids between pools. The cross-flow may contaminate a non-saline water zone or result in an adverse impact on the recovery of hydrocarbons from a pool/zone involved. For example, recovery may be adversely impacted by cross-flow of fluids by gas entrapment behind perforations, by precipitate formation resulting from incompatible reservoir fluids, or by the movement of fine particles. In addition, a water-sensitive formation may be damaged by the cross-flow of water.

15) If the application has been filed because the reservoir pressure of a pool or zone proposed for commingling exceeds 90 per cent of the lesser of the closure or breakdown fracture pressure of one of the other pools or zones proposed for commingling,

   a) calculations to demonstrate that the reservoir pressure of a pool or interval proposed for commingling exceeds either

      - 90 per cent of the fracture closure pressure of a shallower zone that has been fracture stimulated, or
      - 90 per cent of the fracture breakdown pressure of a shallower zone that has not been fracture stimulated,

   b) confirmation that the shallow pool or zone will be segregated during periods that the well is shut in, including a wellbore schematic showing the actual or proposed completion to ensure segregation, and

   c) pressure decline analysis to demonstrate the length of production time needed for the pressure of the higher-pressured pool or zone to decline so that segregation is not required during periods the well is shut in.

Closure pressure is the pressure needed to open and/or extend a fracture resulting from previous stimulation operations. Breakdown pressure is the pressure needed to initially fracture a reservoir during stimulation operations.

Having extreme pressure differences between pools/zones proposed for commingling raises a safety issue in that wellbore control may be jeopardized if fluid from a high-pressured reservoir flows into a lower-pressured reservoir that has a well completion or wellhead equipment not designed for such high pressures. Another concern about the commingling of production from pools/zones with extreme pressure differences arises when a new well is drilled into a pool/zone that has an unusually high pressure due to cross-flow from a commingled completion; this raises a safety issue in that the party drilling nearby may not anticipate the higher pressure.

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16) Identification of the existing or proposed enhanced recovery scheme.

This must include the approval number of any existing scheme or the application number or details of a proposed scheme.

17) For any oil pools involved,	
a) confirmation that the oil pools have a common rate control or, alternatively, a separate application requesting a change in rate control has been submitted to the AER,	Production from oil pools with different rate controls may not be commingled.
b) if there is associated gas, confirmation that approval of concurrent production has been obtained or that a separate application requesting concurrent production approval has been submitted to the AER,	Separate applications must be submitted for commingling approval and for concurrent production and good production practice.
c) a discussion respecting whether the oil pool involved contains or has potential for an enhanced oil recovery scheme and, if so, the possible effect of approval for commingling of production on the effectiveness of such a scheme, and	Commingling of production in the wellbore might not be an optimum strategy when it may hamper the effectiveness of an enhanced recovery scheme.
d) an evaluation of the oil and gas reserves for each pool, including	
i) an estimate of the initial oil volume and gas volume in place,	
ii) an estimate of the oil and gas recovery factors,	
iii) a description of the methods used in determining (i) and (ii) above (e.g., material balance, volumetric analysis, model study, a comparison of analog pools), and	
iv) the supporting data used in determining (i) and (ii) above and the sources of the data (e.g., pressure/volume/temperature [PVT]	

properties and source, pressure data and source).	
18) For any gas pool located in an oil sands area, a) confirmation that there is no shut-in order for the subject well and zones arising from a gas/bitumen proceeding and that the wells and zones are not subject to any upcoming gas/bitumen proceeding, b) a statement that the well involved would be producing in accordance with AER *Interim Directive (ID) 99-01*, and c) a discussion indicating that the loss of individual pool data resulting from the commingling will not adversely affect future evaluation of the impact of gas production on the bitumen resource in the area.	For wells drilled and/or completed in a defined oil sands strata after July 1, 1998, you must submit an application and obtain approval from the AER before any gas, other than solution gas, may be produced. In an area where pool performance and pressure data are scarce (e.g., low drilling density, limited production), the ongoing collection of zonal data may prove crucial to future decisions on gas production and to the re-evaluation of past gas production approvals. Unless the AER is satisfied that the region of influence of the gas zones in the area is well defined, commingling may be denied.
19) If an area-based approval is being requested, a) evidence, with supporting discussion and analysis, that the application applies to specific zones in all portions of the area of application,	Evidence would normally include a geological interpretation, along with data that show that the zones are present and productive throughout the area of application. Data from contiguous lands not owned by the applicant may be used in support of the application. The discussion and analysis may be combined with related information required in this section.
b) a discussion demonstrating that conservation goals are at least as likely to be achieved through commingling of production as through segregated operations, and	The discussion should show that the loss of individual pool or zone data resulting from the commingling will not adversely affect the ability of the operator to adequately manage pool operations in future.

c) a tabulation of all relevant data for the zone and area of interest (not just the applicant's working interest lands), including
    i) deliverability and flow test information, together with the type and date of the test,
    ii) initial and current zone/pool pressures, together with an indication of the type and date of the test, and
    iii) a summary of the current daily production rate (as calculated on operating time) for the wells and pools in the area under evaluation,

together with a discussion showing that there are sufficient existing data to demonstrate a pattern of production performance in the area for which the application is being made.

The density of well information required to successfully make a case that there are sufficient existing data to demonstrate a pattern of production performance in the area involved will vary according to the complexity of the geology in the area.

3.2 Background to Good Production Practice, Gas-Oil Ratio Penalty Relief, and Special Maximum Rate Limitation

Most new oil pools in Alberta initially have rate controls applied. These restrictions are designed to ensure that oil pools in the province are not significantly depleted before the pool's optimum depletion strategy can be determined. This helps to ensure that enhanced oil recovery (EOR) feasibility is addressed early in the pool's life, along with solution-gas conservation, concurrent production, and any equity problems among operators in the pool. The tool used by the AER to impose rate controls is the Maximum Rate Limitation (MRL) Order.

Generally, the AER will not approve accelerated production rates to improve the economics for initiating enhanced recovery or data gathering to determine and assist in optimization studies. The AER also notes that the applicant should refer to *Directive 007-1: Allowables Handbook* for details on the administration of allowables and the rules regarding retirement of overproduction.

Applications to remove oil rate controls fall into three categories:

- a request that the oil pool be removed from the MRL system (good production practice [GPP])
- a request for an amendment to the MRL Order modify or remove gas-oil ratio (GOR) penalties
- a request for an amendment to the MRL Order increase the MRL above its reserves-based value (Special MRL)

Before approving any of the above applications, the AER must be satisfied that

- the pool is operating under its optimum depletion strategy to ensure that economic oil recovery is maximized,
- gas conservation has been addressed using the decision tree and economic decision process set out in AER *Directive 060*, and
- equity issues have been resolved.

Because the issues are the same in each application, the AER often approves GPP when GOR penalty relief and/or Special MRL have been applied for. The following section outlines the content requirements for these three applications, starting with GPP. GOR penalty relief and Special MRL are treated as alternatives to GPP when unique circumstances exist that would preclude granting GPP.

3.3 Application for Good Production Practice—Primary Depletion Pools

This section deals only with GPP applications for pools under primary depletion. GPP removes a pool from restrictions imposed by the AER's monthly MRL Order and is granted under section 10.060 of the *Oil and Gas Conservation Rules*. Under GPP, the wells in a pool are not restricted by base allowable or GOR penalties. However, as the name implies, operators are expected to produce the wells in accordance with good engineering practices to optimize oil recovery. The AER may rescind GPP approval if new information or technology indicates that production under GPP may affect conservation or the rights of other owners in the pool. GPP may be granted with concurrent production restrictions on gas cap production or other conditions.

Note that for pools under primary depletion, GPP is granted to the pool, not to individual wells. For pools where EOR schemes exist, GPP is usually granted only to the ER oil scheme areas.

3.3.1 Requirements for an Application for GPP

Requirements

1) Your geological interpretation of the pool, including
    a) a net pay isopach map of the pool, including both oil and gas if there is an associated pool,
    b) where pool delineation or fluid interface locations are based on structural interpretation, a structure contour map of the pool and offsetting area,
    c) an interpreted and annotated log cross-section or representative well log(s) showing the
        i) stratigraphic interpretation of the zone(s) of interest,
        ii) interpretation of the fluid interfaces present,
        iii) completions and treatments to the wellbore(s), with dates,
        iv) cumulative production,
        v) finished drilling date and kelly bushing (KB) elevation, and
        vi) scale of the log readings, and
    d) a tabulation of your interpreted net pay, porosity, and water saturation for each well in the pool, along with the cutoffs, methodology, formulas, and constants used.

Comments

For primary pools, GPP is granted to the entire oil pool. Therefore, the application must provide a geological interpretation of the entire pool, not just lands you own.

If it will help to clarify your basis for pool delineation or other aspects of your geological interpretation, you should submit a log cross-section containing wells both within and outside of the pool. As a minimum, you must submit at least one representative well log from a well in the pool showing the information required in item 1(c).

You must provide a clear picture of your geological interpretation, including the potential for further pool development.

2) Your evaluation of the oil and gas reserves for the pool, including

   a) an estimate of the initial oil volume and gas volume in place,

   b) an estimate of the oil and gas recovery factors,

   c) a description of the methods used in determining (a) and (b) above (e.g., material balance, volumetric analysis, model study, and a comparison of analog pools), and

   d) the supporting data used in determining (a) and (b) above and the sources of the data (e.g., pressure/volume/temperature [PVT] properties and source, pressure data and source).

The size of oil and gas cap reserves affects depletion strategy, EOR feasibility, and gas conservation economics.

The stage of depletion of the pool may influence the AER's decision and should be discussed where appropriate.

If there are sufficient pressure, production, and PVT data, you should do a material balance evaluation and compare it to the volumetric results.

Failure to provide information on the calculation methods and supporting data will delay processing of your application.

It is not necessary to provide production plots for the wells, except to illustrate a particular point or issue (e.g., decline analysis, specific well performance issues).

3) A discussion and analysis of why waterflooding or some other form of enhanced oil recovery (EOR) is not feasible for this pool. This should include

   a) your screening criteria and supporting calculations and data,

   b) if EOR was found to be technically feasible but uneconomic, your economic evaluation and supporting data, and

EOR evaluation is a critical part of any GPP application, and processing delays will result if it is not done properly. If the AER agrees that the pool is a single-well oil pool with no potential for expansion or further drilling or is in good communication with a fully active aquifer system, EOR will not be an issue.

If EOR is considered feasible, GPP will be denied pending implementation of EOR.

c) if numerical simulation was used, a description of the model, the input data, results of history matching, cutoffs used for each case, descriptions of the cases run, and summaries and analyses of the results.	
4) Analysis, discussion, and supporting data to show that producing the pool under GPP is the optimum depletion strategy for the pool. If there is gas-cap gas production, you need to supplement this with the information required for a CCP application and identify further conditions needed to approve CCP (e.g., gas rate limit, maximum GOR).	This should build on the analyses in items 3 and 4 above. Having eliminated EOR, you must satisfy the AER that producing wells at unrestricted rates will not reduce primary recovery. If the MRL and GOR penalties do not restrict production in the pool now or in the future, you should include this in your discussion. At this point you may wish to request a reduced pressure test frequency in the pool if you can show that a lesser frequency is appropriate. Failure to adequately address CCP will delay processing. Please refer to the CCP application requirement in unit 2, section 2.4.
5) A discussion of the status of gas conservation from wells in the pool, including wells owned or operated by others. This discussion should a) confirm that full gas conservation from all wells is occurring and will continue, or b) outline the schedule for implementation of full gas conservation, or c) justify why you are not proposing full gas conservation under GPP.	Your evaluation of gas conservation should use the decision tree and economic decision process set out in AER *Directive 060*, sections 2.3 and 2.4. Under full gas conservation, only nonroutine flaring can occur. *Directive 060*, section 2.6, defines nonroutine flaring at conserving facilities and specifies operational requirements to minimize this flaring. Failure to address gas conservation in accordance with *Directive 060* will result in processing delays and deficiency requests.

6) Individual legible maps showing

   a) the lessees in and adjoining the applied-for pool, and

   b) the lessors in and adjoining the applied-for pool.

To ensure clarity, you should construct your own map, rather than submit a photocopy from part of a commercial land map you purchased. Confusion about ownership in the area will delay processing.

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7) If there is mixed ownership in the pool,

   a) state that you are applying on behalf of all well licensees in the pool, or

You are encouraged to apply on behalf of all well licensees in the pool. If not, the AER's application process must ensure that parties having a bona fide interest in the application are provided an opportunity to intervene. For more information, refer to the *Oil and Gas Conservation Act* and the corresponding *Responsible Energy Development Act*.

   b) identify the well licensees not represented, explain why they are not represented, and evaluate the impact that GPP approval will have on the rights of these owners.

Your evaluation of the impact on parties not represented should include supporting data; otherwise processing will be delayed.

3.4 Application for Gas-Oil Ratio Penalty Relief

GOR penalties are applied to an oil well's MRL when the producing GOR exceeds the base GOR. The penalty factor is calculated by taking the ratio of the base GOR to the producing GOR. The MRL is then multiplied by this penalty factor to determine the adjusted MRL (the permitted production rate). GOR penalty relief is applied for under section 10.060 of the *Oil and Gas Conservation Rules*.

GOR penalty relief applications face the same issues as GPP. For this reason, when processing a GOR penalty relief application, the AER will often grant GPP, with full gas conservation as a condition. GOR penalty relief is approved through the application of a net GOR penalty factor, which reduces the GOR penalty by subtracting out any fuel gas or gas delivered to an approved gas gathering system.

GOR penalty relief is not automatic when gas is conserved. When GORs rise significantly above the solution GOR of the oil, this indicates that pressure depletion and/or gas cap coning is occurring, neither of which is desirable for optimum oil recovery. These issues must be addressed before an application can be approved, despite ongoing gas conservation.

3.4.1 Using the O-33 Form

To apply for GOR penalty relief, operators often use the O-33 form, which was introduced in 1989 as part of *Informational Letter (IL) 89-14*. The O-33 form is specifically targeted at small (one or two wells), low-quality pools (rates below minimum allowable initial high-water cuts). *Directive 065* supersedes the requirements set out in *IL 89-14*, but the AER will continue to accept the O-33 form for small, low-quality oil pools if the conservation and equity issues are not complex. See appendix C for a copy of the O-33 form.

3.4.2 Requirements for an Application for GOR Penalty Relief

For GOR penalty relief application requirements please use the GPP application requirements and comments (section 3.3.1). Note that CCP must also be applied for (see section 2.4) if the high GORs are a result of production from a gas cap. You should also state in your application why you are applying for GOR penalty relief rather than GPP.

3.5 Application for Special Maximum Rate Limitation (MRL)

A Special MRL is an MRL approved by the AER that is greater than the reserves-based MRL. Special MRLs can be applied to entire pools or individual wells. Relatively few Special MRL applications are received or approved each year because, like GOR penalty relief, Special MRL applications have the same issues involved as GPP. For this reason, when processing a Special MRL application, the AER will often grant GPP. A Special MRL is applied for under section 10.060 of the *Oil and Gas Conservation Rules*.

3.5.1 Requirements for an Application for a Special MRL

For Special MRL application requirements please use the GPP application requirements and comments (section 3.3.1). You should also state in your application why you are applying for Special MRL rather than GPP.

3.6 Application to Amend or Rescind a Gas Allowable Order

3.6.1 Background

There are essentially three situations when the AER may issue a gas allowable (GA) order for the purpose of setting the maximum allowed gas production rate for a gas well or wells in a pool:

- if the ultimate recovery of gas may be adversely affected by unrestricted production rates (section 10.300(1) of the *Oil and Gas Conservation Rules* [*OGCR*]),
- if a gas well is completed outside of its prescribed target area and it is necessary to apply an off-target penalty to the well's base allowable for equity reasons (section 4.070(1) of the *OGCR*, AER *Interim Directives [IDs] 94-02* and *94-05*), and
- if the AER has deemed a fractional tract of land to be a drilling spacing unit and there is a need to apply an area-ratio production penalty or off-target penalty for equity reasons (section 4.050 of the *OGCR*).

Section 10.095 of the *OGCR* designates that the base allowable for a gas well shall be its maximum daily allowable (Q_{max}). The calculation of Q_{max} is explained in section 10.300(1)(c) of the *OGCR* and in AER *Informational Letter (IL) 85-10*. In all instances above, the penalties are applied against the well's Q_{max} and an annual allowable (based on this Q_{max} and the number of days in the year) is assigned.

3.6.2 When to Make This Application

When a well is subject to an AER gas allowable (GA) order and the well's licensee believes that circumstances warrant the allowable being rescinded or amended, an application can be made to change the allowable in accordance with section 10.300(4) of the *OGCR*. There are a number of reasons for a change to a gas well's allowable, including

- equity (e.g., there is no longer an offsetting productive well),
- conservation (e.g., there is no longer a reason to restrict the rate for conservation reasons),
- pool delineation (e.g., data support a new pool interpretation that does not warrant the application of a gas allowable to the well), or
- administrative (e.g., the well can no longer meet the allowable).

The original reason for the initial assignment of the allowable will dictate the basis for any requested change, and the application must address what has changed since the original allowable was assigned to the well to justify the application. The majority of gas allowables are assigned for equity purposes, resulting in equity matters being of primary consideration in most applications to amend or rescind a GA order.

3.6.3 How the AER Processes the Application

Upon receipt, the AER reviews the application for completeness according to the following requirements. Particular attention is paid to equity considerations. If pool delineation is an issue (i.e., the AER's current pool delineation is different from the applicant's and this difference is material to the assignment of the allowable), the AER will undertake geologic and engineering reviews of the pool delineation. In all cases, contact with offset licensees will be checked to ensure that proper notification is conducted. In particular, contact with any offset licensee that caused the assignment of the original allowable will be ensured. Once the technical, administrative, and equity aspects of the application have been reviewed, a decision will be issued or a hearing will be set to consider the matter.

3.6.4 Requirements for an Application to Amend or Rescind a Gas Allowable Order

An application under section 10.300(4) of the *OGCR* to either amend or rescind the maximum daily allowable prescribed to a gas well must include the following. The information required can vary, as noted in the Comments column below, depending on the reason for the original allowable being assigned.

Administration

Requirements	Comments
1) A statement that the application is made in accordance with section 10.300(4) of the *OGCR*.	This is a legal requirement.
2) The unique well identifier of the well for which you are requesting a change in the allowable.	
3) A summary of the basis of the application.	Why do you believe that the maximum daily allowable should be changed? You may need to address conservation and/or equity, depending on the reason for the original assessment of the allowable to the well.

Conservation

Requirements	Comments
1) A map showing the net pay isopachs and zero edge of the pool.	The AER requires this information to confirm the pool extent. The pool's net pay and zero edge must reflect your actual geological interpretation of the pool.
2) A map showing the status of each well completed in the pool.	
3) A map showing the structure of the top and base of porosity and the initial and present fluid interfaces.	This information is required only when the allowable was originally assigned for conservation reasons, and then only when structure is pertinent to the application.

4) A map showing isobars of the pool.	This is generally only required if pool delineation is an issue.
5) Tabulations of a) reservoir parameters, b) the estimated initial in-place volumes of gas and other hydrocarbons in the pool, c) for the pool, the current rate of production of gas, other hydrocarbons, and water and an estimate of the probable pool production rates under the proposed operating conditions, and d) for each well, the current productive capacity, the current average production rate, and the production rate anticipated under the proposed operating conditions.	The information referred to in 5(c) and (d) is generally required for the entire pool only when allowables have been set for an entire pool for conservation reasons or when pool delineation is an issue. When only a portion of the pool is affected by the subject allowable, data on just the subject well and immediately offsetting wells are usually sufficient.
6) Discussions of a) pertinent characteristics or conditions that exist within the pool, including geological factors, reservoir characteristic, general or local fluid interface movements, pressure gradients, areal drainage, or production conditions, b) the predicted future recovery of gas and other hydrocarbons from the pool under existing production rate limitations and under the proposed operating conditions, particularly the uniformity of drainage within the pool, and c) the conservation and administrative benefits that would accrue from granting the application.	Information referred to in 6(a) and (b) is required only when the allowable was originally assigned for conservation reasons.

7) An interpreted and annotated log cross-section or representative well log(s) showing

   a) stratigraphic interpretation of the zone(s) of interest,

   b) interpretation of the fluid interfaces present (current and original, if applicable),

   c) completions and treatments to the wellbore(s), with dates,

   d) cumulative production,

   e) finished drilling date and kelly bushing (KB) elevation,

   f) the scale of the log readings, and

   g) a tabulation of your interpreted net pay, porosity, and water saturation for each well in the pool, along with the cutoffs, methodology, formulas, and constants used.

This information is required only when the allowable was originally assigned for conservation reasons or when pool delineation is an issue. You may present this cross-section in a number of ways (as one representative well log, several well logs, or a detailed cross-section of the entire pool) depending on the complexity and heterogeneity of the pool.

If you do not supply tabulated well data for all wells in the pool, you must explain why the data are not included (e.g., the allowable affects only a portion of the entire pool). As a minimum, you must provide the data for the subject well and all immediately offsetting wells.

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8) A discussion of

   a) well completion and recompletion details and assessment of the prospects for control of water production in the future,

   b) operating problems,

   c) the effect of increased production on liquid coning, terminal fluid interface position, and interpool interference,

The information for 8(a) to (e) is required only when the allowable originally was assigned for conservation reasons.

d) the effect on the rates of production of any oil, condensate, or pentanes plus that may be present in the pool if the application is granted,	
e) appropriate economic analyses, and	
f) pertinent reservoir studies.	The information for 8(f) is required only when the allowable was originally assigned for conservation reasons or when pool delineation is an issue.

Notification—Equity

The AER requires the information described below to consider any potential direct and adverse effect to a party and whether equity issues may exist. You are encouraged to carry out the notification described here. The AER reserves the right to advertise any application for its own purposes.

Requirements	**Comments**
1) A map showing	This information generally is required only when the allowable originally was assigned for conservation reasons or when pool delineation is an issue.
a) the zero edge of the pool,	
b) the status of each well completed in the pool, and	
c) the licensees in the pool and for 1600 m surrounding the pool that contains the well for which a change to allowable is requested.	Generally, only when allowables have been set for an entire pool for conservation reasons is the full level of notification referred to in 1(c) required. The 1600 m buffer around the pool is included to ensure that no offset licensees have a different interpretation of the pool. In most cases, affected parties are those considered by the AER to have a productive well in the same geological pool in a drilling spacing unit (DSU) immediately offsetting the subject well.

	If the allowable was established because the subject well is off target, generally only wells in the same geological pool that the subject well is off target towards are considered to be affected, in accordance with AER *Interim Directive (ID) 94-02*. If the allowable was originally assigned for equity reasons, the offset licensees that requested that the allowable be set must be contacted.
2) A list of the parties notified regarding the proposed allowable change, the nature of the notification, the date of notification, and any comments received from the notified parties.	
3) A discussion of the effect that granting the application would have on the interests of other owners in the same pool.	

Unit 4 Disposal/Storage

4.1 Application for Disposal (Classes I–IV)

4.1.1 Background

Disposal refers to the injection of fluids into underground formations for purposes other than enhanced recovery or gas storage. In accordance with the *Oil and Gas Conservation Act*, section 39(1)(c), AER approval of a scheme is required for the gathering, storage, and disposal of water produced in conjunction with oil and gas. Section 39(1)(d) requires AER approval of a scheme for the storage or disposal of any other fluid or substance to an underground formation through a well. The disposal scheme approval holder must be the licensee of all the wells on the approval.

The AER classifies disposal wells based on the type of injection fluid. This classification system is outlined in *Directive 051: Wellbore Injection Requirements*.

Directive 051 applications related to the disposal of Class Ia, Ib, IIIa, or IIIb fluids must be submitted at the same time as the associated *Directive 065* application. *Directive 051* applications for the disposal of all other type fluids may be submitted at any time before or after the submission of the *Directive 065* application.

The *Directive 065* and *Directive 051* applications must be submitted using the Digital Data Submission (DDS) system, available through the Systems & Tools portal on the AER website, www.aer.ca.

All disposal wells must meet the *Directive 051* requirements prior to the commencement of fluid injection.

4.1.2 When to Make This Application

If the disposal of a fluid is required and you are certain that disposal at the proposed location will not cause an environmental or safety hazard and will not result in incremental hydrocarbon recovery, then you should make an application for disposal to the AER.

The AER will permit, without application, a maximum cumulative water injection of 500 m^3 in order to acquire the information required under *Directive 051* and to determine the maximum wellhead injection pressure (MWHIP).

4.1.3 Application Requirements for a Disposal Scheme

General

Requirements	Comments
1) A description of the proposed disposal scheme, including	
a) unique well identifier(s),	
b) disposal zone with zone top and base,	
c) disposal perforations,	
d) disposal fluid class,	You should identify the class of the disposal fluid according to the system outlined in *Directive 051*.
e) anticipated daily disposal volume(s),	
f) depth of the production packer, and	In accordance with *Directive 051*.
g) the base of the usable groundwater.	Base of groundwater protection (BGWP) elevations are available for locations across Alberta by using the Base of Groundwater Protection Query Tool on the AER's Systems & Tools portal. For additional information or questions about the tool, contact the AER Customer Contact Centre by telephone at 403-297-8311 or 1-855-297-8311 (toll free) or by e-mail at inquiries@aer.ca.
2) A statement on why the proposed well is suitable for disposal.	
3) A statement on why the proposed disposal is required.	

4) An indication of whether you have applied for or obtained approval for related surface facilities.	Surface facility applications must be made in accordance with *Directive 056* or *Directive 058*.
5) Identification of the following: a) fluid type currently in the disposal interval (i.e., water, gas, or oil), b) confinement strata, c) porosity and permeability of the disposal zone, d) viscosity of the injected fluid and the reservoir fluid, and e) the distance between the proposed disposal well(s) and any hydrocarbon pool or accumulation.	

Conservation

If disposal is to occur into a hydrocarbon pool or an associated aquifer, it must be evident that it will not have a detrimental effect on the ultimate hydrocarbon recovery from the pool.

If the proposed disposal well is more than 1.6 km from any potentially affected hydrocarbon pool or accumulation, you may omit requirements relating to conservation.

Requirements	**Comments**
1) A discussion on hydrocarbon pools or accumulations within 1.6 km of the disposal well.	
2) If disposal is into a hydrocarbon zone or associated aquifer: a) Identification of the hydrocarbon zone to receive the disposal fluid.	

b) A statement on whether incremental hydrocarbon recovery is anticipated as a result of the proposed injection. If it is, state the incremental volume relative to the original oil in place (OOIP).

If incremental recovery is anticipated as a result of the proposed injection, consider applying for enhanced recovery rather than disposal.

c) A discussion on the stage of depletion of the recipient hydrocarbon zone.

d) A statement on whether the hydrocarbon zone contains an oil-water (o/w) or gas-water (g/w) contact. Provide the depths of all contacts in relation to the proposed injection interval.

e) An explanation of why the proposed disposal would not be detrimental to ultimate hydrocarbon recovery.

If disposal is to occur into a hydrocarbon zone or an associated aquifer, it must be evident that it will not have a detrimental effect on ultimate hydrocarbon recovery.

f) A discussion on whether the proposed injection would have an impact on any producing wells within the hydrocarbon zone.

g) A discussion on all AER-approved water disposal currently occurring in the hydrocarbon zone, a list of those disposal wells, and comments as to how the proposed disposal is compatible with the current disposal locations.

Multiple disposal wells in a zone require careful placement in order to avoid over injection in any one part of the zone and to avoid trapping losses.

h) A discussion on whether there is an enhanced recovery scheme in the subject zone. If there is, explain why the proposed disposal cannot be incorporated into the scheme and why or how the proposed disposal is compatible with the current injection.

i) A net pay isopach map of the zone, including both oil and gas if there is an associated gas pool.

j) If pool delineation or fluid interface locations are based on structural interpretation, a structure contour map of the pool and offsetting area.

k) A tabulation of your interpreted net pay, porosity, and water saturations for each well in the zone, along with the cutoffs, methodology, formulas, and constants used.

If you do not supply tabulated well data for all wells in the pool, you must explain why (e.g., the area of application is very small relative to the entire zone).

l) A discussion on the proposed maximum operating pressure for disposal into the receiving hydrocarbon zone or the associated aquifer.

The AER believes that disposal wells that are injecting into hydrocarbon zones without volume restrictions could ultimately result in the zone's pressure exceeding the formation's initial pressure. As a preventive measure, a maximum operating pressure will be applied to all disposals into hydrocarbon zones or associated aquifers based upon the initial pressure of the zone.

Certain wells and pools may be placed on the annual pressure survey schedule.

Hydraulic Isolation

Disposal approvals specify the disposal zone and limit injection to that zone only. Migration of disposal fluids to other zones is highly undesirable. Therefore a suite of logs, in addition to the following information requirements, is needed for all injection wells in the province to confirm that there is no flow of injected fluid behind the casings. For more details on the logging requirements, see AER *Directive 051*. The *Directive 051* requirements must be met prior to the commencement of injection.

Requirements

1) For disposal wells injecting hydrogen sulphide (H_2S), Class I, Class IIIa, or Class IIIb fluids, all completion logging, testing requirements, and associated discussion required by *Directive 051*.

All H_2S, Class I, Class IIIa and Class IIIb disposal wells must meet the *Directive 051* requirements prior to the wells going on injection and prior to the approval being issued. It is necessary to ensure that the integrity of the wellbore will prevent contamination of other zones and protect all groundwaters. A preliminary review of the application and a letter noting approval in principle pending successful *Directive 051* completion and proven injectivity may be issued if you desire to proceed with the application in two stages.

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2) In order to prove hydraulic isolation for Class II, Class IIIc and Class IV disposal, provide the following:
   a) the completion logs and associated discussion required by *Directive 051* for all proposed disposal wells, or
   b) a discussion of the plans for complying with *Directive 051*, or
   c) a request for waiver of the *Directive 051* requirements, or
   d) a copy of an AER letter waiving the *Directive 051* requirements.

You should specify in the application whether the proposed disposal wells are in compliance with *Directive 051* requirements. If they are not, provide a discussion of the plans to bring the wells into compliance with *Directive 051* or indicate that a waiver is requested or has been approved. It is not necessary for *Directive 051* requirements to be met in order for a disposal scheme approval to be issued except when H_2S, Class I, Class IIIa or Class IIIb disposal is requested.

All disposal well completions must meet the *Directive 051* requirements prior to the wells going on injection in order to ensure that hydraulic isolation of the disposal interval exists at the wellbore and that the disposal fluid will enter the intended reservoir interval.

The AER will permit injection of up to 500 m^3 of water to obtain the required isolation logs.

	If you have met *Directive 051* requirements for the proposed disposal wells, you must include the completion logs and associated discussions required by the directive. The AER will then handle all matters pertaining to the completion approval(s) concurrently with the scheme approval. **If you have not met *Directive 051* requirements, disposal may NOT commence until you have received a letter from the AER stating that the *Directive 051* requirements have been met and injection can commence.**
3) If requesting an extension to the three-month *Directive 051* submission date, provide a) the proposed submission date, and b) the reasons(s) for needing the submission date extension.	Disposal well approvals issued in advance of *Directive 051* requirements being met will contain a clause requiring that the *Directive 051* information be submitted within three months of the approval's issue date. If three months is not sufficient time to meet the *Directive 051* requirements, you must request an extension.
4) When submitting *Directive 051* information after the approval has been issued, you should provide the field and pool name, the disposal scheme approval number, and the well location(s).	If the *Directive 051* requirements are not submitted within the three months or other approved time frame, AER staff will rescind the approval or portion pertaining to the subject wells. For more information on submission requirements and the disposal approval process, see AER *General Bulletin (GB) 2000-8*.
5) Provide the following information for either (1) all the wells in the pool if disposal is into a depleted hydrocarbon pool or (2) all the wells within the disposal well section and adjoining sections if disposal is into an aquifer system:	There must be hydraulic isolation between the disposal fluid and any other wellbores drilled into or through the disposal zone.

a) well location,

b) status of well,

c) completion intervals, and

d) all casing information.

Containment

Requirements	Comments
1) A discussion of the geological setting of the proposed disposal zone, base, and caprock.	The geological discussion should include continuity, thickness, lithology, and integrity of all zones. If fracturing is evident, explain how containment can be assured. Discussion on the disposal zone should include reservoir parameters.
2) The following maps: a) structure and isopach maps of the proposed disposal zone, and b) an isopach map of the confinement strata.	Maps should be at a 1:50 000 scale with a radius of at least 1.6 km from the proposed disposal well(s). The radius should take into account an extended area of influence and/or any impacts to containment or conservation.
3) An interpreted and annotated log cross section or representative well log(s) showing a) stratigraphic interpretation of the zone(s) of interest, b) interpretation of the fluid interfaces present, c) completions and treatments to the wellbore(s), with dates, d) cumulative production, and	All log cross sections and well logs must include the header.

e) finished drilling date and kelly bushing (KB) elevation.

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4) Confirmation that all wells within the area of influence have been completed or abandoned in a manner that prevents the migration of the injected fluid or substance to another formation.

Maximum Wellhead Injection Pressure

All disposal wells will be subject to a maximum wellhead injection pressure (MWHIP). Best practices for determining the MWHIP use the formation fracture pressure with a safety factor applied. The formation fracture pressure may be determined by step-rate injectivity tests, in situ stress tests, or reliable offset data. In the absence of such information, the MWHIP prescribed in appendix O, table 1, is assigned to the disposal well.

Requirements	**Comments**
1) A statement of the proposed MWHIP and what it is based on.	Injectivity test data will be accepted as a means to evaluate the formation fracture or parting pressure, or to confirm injectivity without formation fracture. See appendix O for test procedures.
2) If requesting a MWHIP other than that prescribed in appendix O, table 1: a) Technical justification of the proposed MWHIP. Include the complete test data and all analyses. b) A discussion on the appropriate safety factor to ensure fluid containment.	Justify all analogous sources used. Wellhead injection pressure must be less than or equal to the MWHIP at all times. Data from fracture stimulations operations will not be accepted. The AER generally applies a safety factor of 10 per cent unless an alternative is adequately justified. The AER may request tests performed on the caprock to support a requested injection pressure.

	Licensees are responsible for providing historical wellhead injection pressure data to the AER for an audit.

Notification, Equity, and Safety

Requirements	**Comments**
1) Evidence of your right to dispose into the proposed zone.	Proof of the right to dispose in a formation is as follows: • unleased Crown land—a letter of consent from the Crown, • Freehold lease land—consent from the Freehold mineral holder, and • leased by other than the applicant—a letter of consent from the lease holder.
2) Provide a) a map showing the boundaries of the disposal pool or the area within the disposal section and the offset section up to a 1.6 km radius with the requisite parties listed below displayed, and b) a statement as to whether the parties shown on the map referred to in 2(a) have been notified about the application and, if so, include any statements of concerns received. Applicants for disposal schemes must follow the stipulations in tables 1, 2, and 3 of the Notification Guidelines.	In addition to meeting the minimum notification requirements, you are expected to notify other parties that may be affected by your application. If a risk to an abandoned well is identified by a licensee and it was abandoned to the standards of *Directive 020*, then the applicant and the licensee have to come to an agreement on what needs to be done to bring the well to the required specifications. If, on the other hand, it is determined that the risk is from a failure to meet the requirements of *Directive 020*, AER has to be notified to ensure compliance.
3) If the proposed injection fluid contains any H_2S, a statement indicating that notification of the scheme for emergency response plan	See *Directive 071: Emergency Preparedness and Response Requirements for the Petroleum Industry* for requirements.

(ERP) purposes has been made. Include the details of any outstanding concerns from the notified parties.	
4) For Class I wells, a statement as to whether the landowners/occupants within a 0.5 km radius of the proposed disposal well have been notified about the application and, if so, include any statements of concerns received.	

4.1.4 Additional Requirements for Class I Disposal

Containment

Requirements	**Comments**
1) A discussion on the maximum expected area of influence surrounding the proposed well over the life of the scheme, including any pressure gradients that exist as a result of past or current production or injection operations.	
2) An area review to ensure fluid containment. Offsetting wells must be investigated for hydraulic isolation of the disposal zone within the maximum expected area of influence surrounding the proposed well or a 1.6 km radius, whichever is greatest.	Hydraulic isolation of the disposal zone is required and will be considered satisfactory if logging or cementing records show that the subject interval is cemented or isolated. For cement integrity, casing inspection, and hydraulic isolation log requirements, refer to *Directive 051*. For abandonment requirements, refer to *Directive 020: Well Abandonment*.

3) In the case of slurry fracture injection of sand, details of the surface elevation monitoring that will be done within 800 m of the proposed disposal well to monitor the impact of slurry fracture injection of sand above the formation fracture pressure.

The *Directive 051* application for Class I disposal must be submitted at the same time as the associated *Directive 065* application.

4.1.5 Additional Requirements for Class III Disposal

Containment

Requirements	**Comments**
1) Your geological interpretation of the proposed gas disposal formation involved, including a) net pay isopach map of the pool, b) where pool delineation or fluid interfaces are based on structural interpretation, a structural contour map of the pool and offsetting area, c) an interpreted and annotated log cross-section or representative well log(s), showing i) stratigraphic interpretation of the zone(s) of interest, ii) interpretation of the fluid interfaces present, iii) completions/treatments to the wellbore(s), with dates, iv) cumulative production,	It is necessary to determine that there will be containment of the disposal fluid within a defined area and geologic horizon to ensure that there is no migration to hydrocarbon-bearing zones or groundwater. To address this issue, you must provide a suite of geological evidence.

    - v) finished drilling date and kelly bushing (KB) elevation, and
    - vi) the scale of the log readings, and
  - d) tabulation of your interpreted net pay, porosity, and water saturation for each well in the pool, along with the cutoffs, methodology, formulas, and constants used.

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2) For bounding formations, information including
  - a) continuity and thickness of base and caprock,
  - b) lithology,
  - c) integrity of the base and caprock,
  - d) if fracturing is evident, explanation of how containment can be assured, and
  - e) a comment on the stratigraphic, structural, or combination reservoir trap type and its containment features.

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3) A discussion on the maximum expected area of influence surrounding the proposed well over the life of the scheme, including any pressure gradients that exist as a result of past or current production or injection operations.

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4) An area review to ensure fluid containment. Offsetting wells must be investigated for hydraulic isolation of the disposal zone within the maximum expected area of

Hydraulic isolation of the disposal zone is required and will be considered satisfactory if logging or cementing records show that the subject interval is cemented or isolated.

influence surrounding the proposed well or a 1.6 km radius, whichever is greatest.	For cement integrity, casing inspection, and hydraulic isolation log requirements, refer to *Directive 051*. For abandonment requirements, refer to *Directive 020: Well Abandonment*.

The *Directive 051* application for Class IIIa and IIIb fluids must be submitted at the same time as the associated *Directive 065* application.

Fluid Properties

Requirements	**Comments**
1) Analysis of the native reservoir fluid(s).	The impact of the disposal fluid on the reservoir rock matrix, native fluid, and the pressure variations subjected to the disposal zone requires that you address phase behaviour, pressure, and migration issues.
2) Gas properties, including a) composition, b) viscosity, density, gas injection formation volume factor, and compressibility factors, and c) phase behaviour through the range of pressures and temperatures to which the injected fluid will be subjected.	
3) An analysis of laboratory testing for determining injected fluid interaction with matrix, caprock matrix, and native fluid(s).	
4) Migration calculation showing radius of influence, as well as a discussion if migration could occur due to displacement,	

gravity, fingering, etc. (not required for depleted reservoirs less than two sections in areal extent).

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5) Complete pressure history of the pool, with material balance calculations if proposed disposal zone is a depleted hydrocarbon pool.

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6) Injectivity of the reservoir, proposed daily maximum injection rate, cumulative disposal volume, and expected life of the scheme.

4.1.6 Disposal Scheme Amendment

A disposal scheme holds a number of disposal wells of the same class, under the same licensee, and in a specific field.

A "Disposal Scheme: Amend" application must also be submitted to the AER, through the DDS system, to amend the conditions on existing disposal wells.

The "Disposal Scheme: Amend" application may be used to request the following changes:

- revise MWHIP,
- change perforation interval (within the same formation),
- change injection packer depth,
- amend scheme-specific operating conditions,
- rescind a disposal well, or
- terminate the scheme.

An application to revise the MWHIP must also meet the requirements set out under the heading "Maximum Wellhead Injection Pressure" in section 4.1.3.

Each application should have an attachment that clearly sets out the request and the reason behind it.

4.2 Application for Underground Gas Storage

4.2.1 Background

The storage of gas into underground hydrocarbon reservoirs can be for production-motivated reasons or commercial operations. Production-motivated schemes are usually characterized by the temporary storage of gas occurring at or near the producing pools. They can allow for the more efficient use of production and processing facilities and may also be of benefit in market-related situations. Commercial gas storage schemes are designed to provide an efficient means of balancing supply with a fluctuating market demand. These schemes store third-party nonnative gas, allowing marketers to take advantage of seasonal price differences, effect custody transfers, and maintain reliability of supply. Gas from many sources may be stored at commercial facilities under fee-for-service, buy-sell, or other contractual arrangements.

The AER regulates gas storage operations to ensure that gas conservation, equity, environment, and safety issues are addressed and to maintain up-to-date estimates of provincial gas reserves and deliverability.

4.2.2 Terms of Application

An application for approval of a new scheme or amendment to an existing scheme for the underground storage of gas is made under section 39(1)(b) of the *Oil and Gas Conservation Act*. The application must meet the requirements below and include any other information requested by AER staff for evaluation purposes.

Applicants must submit the *Directive 065* application through the AER's Digital Data Submission (DDS) system.

The *Directive 051* application associated with the storage of Class IIIa and IIIb fluids must be submitted at the same time as the *Directive 065* scheme application. For all other types of fluids, the *Directive 051* application may be submitted at any time before or after the submission of the *Directive 065* application.

All storage wells must meet the *Directive 051* requirements.

4.2.3 Application Requirements for Underground Gas Storage

Conservation

The AER is concerned about any reserve losses that may occur through gas storage. Reservoir containment of the gas, gas trapping by water, excessive water production, and the dilution of produced gas by acid gas are the primary issues that need to be evaluated.

Requirements	Comments
1) Your geological interpretation of the pool, including	
a) a net pay isopach map of the pool, including both oil and gas if there is an associated pool,	If the pool has a good geological history that is well defined, only one representative well log is likely required. However, if the pool is complex and has had recent development, you should provide several well logs to a detailed cross-section of the pool. If the geological interpretation submitted is not adequately done, processing delays could result.
b) if pool delineation or fluid interface locations are based on structural interpretation, a structure contour map of the pool and offsetting area,	
c) an interpreted and annotated log cross-section or representative well log(s) showing i) stratigraphic interpretation of the zone(s) of interest, ii) interpretation of the fluid interfaces present, iii) completions and treatments to the wellbore(s), with dates, iv) cumulative production, v) finished drilling date and kelly bushing (KB) elevation, and vi) the scale of the log readings, and	All log cross sections and well logs must include the header.
d) a tabulation of your interpreted net pay, porosity, and water saturation for each well in the pool, along with the cutoffs, methodology, formulas, and constants used.	

2) The following maps: a) structure and isopach maps of the proposed storage zone, and b) isopach map of the confinement strata.	Maps should be at a 1:50 000 scale with a radius of at least 1.6 km from the proposed storage well(s). The radius should take into account an extended area of influence and/or any impacts to containment or conservation.
3) Maximum bottomhole injection pressure and maximum average reservoir pressure.	This information defines the upper limit to the operating pressures of the scheme.
4) Complete tabulated pressure history of the pool (date, well, type of test, stabilized pressure), along with a P/Z versus cumulative gas production plot if the pool is a nonassociated gas pool, or material balance calculations if storage is into a gas cap in communication with an oil leg.	This history indicates pressure support from the aquifer and how the reservoir may react to storage.
5) Gas analysis of the native reservoir fluid and the proposed injected gas stream(s).	This describes what the compositions of the gases are before they become mixed.
6) Discussion of how the storage of gas will be consistent with sound conservation practices.	
7) If at any time during storage, the average reservoir pressure will exceed the initial pool pressure (i.e., delta pressuring is being applied for), then reservoir containment of gas becomes a concern and the following are required:	
a) for the storage formation, a list of the formation fracture pressure and fracture propagation pressure, with a description of how they were determined, and	It is necessary to determine if the storage formation will be fractured and/or the extent to which the fractures may spread.

b) for the bounding formations, i) the continuity and thickness of base and caprock, ii) lithology, iii) evidence of fracturing, iv) a comment on the integrity of the base and caprock (stratigraphic, structural, or combination) and its containment features, and v) caprock threshold pressure.	
8) If there is an active aquifer system present, the trapping of gas displaced into the rising aquifer is a concern and the following are required:	
a) any measured changes in the gas/water contact, and	This will indicate where trapped gas can occur.
b) impact from the aquifer, including quantifying the amount of displaced gas that will be trapped.	This will state the impact by the aquifer and indicate whether it is a concern for storage.
9) If there are wells in the pool that have produced or are producing with high water/gas ratios (e.g., over 100 $m^3/10^6\ m^3$), loss of wells due to water coning or channelling is a concern and the following are required:	
a) production history for the wells with high water/gas ratios, and	This will show where the water problems may be occurring in the pool and how they were/are handled.
b) a discussion on how the water production is controlled.	

The *Directive 051* application for the storage of Class IIIa fluids must be submitted at the same time as the associated *Directive 065* application.

Maximum Wellhead Injection Pressure

All disposal wells will be subject to a maximum wellhead injection pressure (MWHIP). Best practices for determining the MWHIP use the formation fracture pressure with a safety factor applied. The formation fracture pressure may be determined by step-rate injectivity tests, in-situ stress tests, or reliable offset data. In the absence of such information, the MWHIP prescribed in appendix O, table 1, is assigned to the injector.

Requirements	**Comments**
1) A statement of the proposed MWHIP and what it is based on.	Injectivity tests will be accepted as a means of evaluating formation fracture or parting pressure, or to confirm injectivity without formation fracture. See appendix O for test procedures.
2) If requesting a MWHIP other than that prescribed in appendix O, table 1: a) Technical justification of the proposed MWHIP. Include the complete test data and all analyses. b) A discussion on the appropriate safety factor to ensure fluid containment.	Justify all analogous sources used. Wellhead injection pressure must be less than or equal to the MWHIP at all times. Data from fracture stimulations will not be accepted. The AER generally applies a safety factor of 10 per cent unless an alternative is adequately justified. The AER may request tests performed on the caprock to support a requested injection pressure. Licensees are responsible for providing wellhead pressure data to the AER during an audit.

Pool Reserves and Deliverability Information

The AER updates and publishes pool reserves data annually. For this reason it needs to understand the operations at the pool. Commercial gas storage pools are also listed in the annual reserves report, but rather than showing the remaining reserves for these pools, the storage capacity and maximum deliverability are published.

Requirements	Comments
1) An estimate of the initial gas and oil volumes in place.	This information will indicate the initial producible gas reserves.
2) An estimate of the gas and oil recovery factors.	
3) A description of the methods used in determining the initial gas/oil volumes in place and the respective recovery factors (e.g., material balance, volumetric analysis, model study, and a comparison of analog pools).	
4) The supporting data used in determining the first two points as outlined above and the sources of the data (e.g., pressure/volume/temperature [PVT] properties and source, pressure data and source).	
5) Remaining native gas in place and the cushion gas required for storage operations.	It is important to determine the remaining native gas in place before storage commences and what additional gas needs to be injected to meet the cushion gas requirements.
6) Working gas volumes.	This information will determine the storage capacity of the pool.

7) Deliverability and injectivity of the reservoir under the range of operating conditions.

This information will indicate the production and injection capabilities of the pool.

Equity

Equity is an important issue for gas storage pools, since competitive gas production would be detrimental to storage scheme operations. Therefore, it is advisable that you own all of the mineral right leases in the pool and adjoining sections or at least have a production-sharing agreement.

Requirements **Comments**

1) Provide the following:

   a) A map showing the boundaries of the storage pool or the area within the storage section and the offset section up to a 1.6 km radius and displaying

      - all well licensees,
      - all mineral lessees, and
      - all mineral lessors;

   and

   b) a statement that the above parties

      - within the area of the storage pool,
      - in all zones above and beneath the storage pool, and
      - in the offsetting section

      have been notified. Include any statements of concerns received.

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2) If you do not hold all of the mineral right leases in the pool, a brief description of the area in the pool where you do not own the mineral right leases and an explanation of why you have not purchased them.

It is important to understand the risk involved with a competing company buying mineral rights and drilling a productive well.

Hydraulic Isolation

Gas storage approvals specify the storage zone and limit injection to that zone only. Migration of fluids to other zones is highly undesirable. Therefore, a suite of logs is required for all storage wells in the province in order to confirm the absence of flow conduits for the storage fluid behind the casing. For more details on the logging requirements, see *Directive 051*. The *Directive 051* requirements must be met prior to the commencement of injection.

Environment and Safety

The AER is also responsible for environmental and safety issues when approving gas storage schemes.

Requirements	**Comments**
1) If the injected fluid contains any H_2S, a statement is required indicating that notification of the scheme for emergency response plan (ERP) purposes has been made. You must include the details of any outstanding concerns from the notified parties.	Where facilities may pose a risk to the public, ERP requirements must be met prior to commencement of operations. Generally, an ERP is required if a risk assessment indicates that there are members of the public within a defined hazard area. ERPs are submitted to the Emergency Preparedness and Audit Section to ensure that the requirements in *Directive 071: Emergency Preparedness and Response Requirements for the Petroleum Industry* have been met. Questions may be directed to the EPA help line at 403-297-2625 or EPAHelpline@aer.ca.

Monitoring Scheme Operation

Requirement	**Comments**
1) A discussion of the monitoring program, including the frequency and method of measuring the bottomhole and/or top-hole pressures.	This discussion will determine how the scheme will be operated to ensure that the approval conditions will not be exceeded.

Unit 5 Approval Transfers

5.1 Approval Transfer for Change of Approval Holder

5.1.1 Background

In accordance with section 15.005(1)(f) of the *Oil and Gas Conservation Rules*, the operator of a scheme approved under section 39 of the *Oil and Gas Conservation Act* is required to apply to amend the approval to show the change of holder of the approval if the scheme has been sold or divested or to show a name change that has occurred since the scheme was approved.

It is important that companies purchasing new properties in Alberta understand the terms and conditions of the approved scheme and that they update the appropriate AER documents. As operators doing business in Alberta, they are responsible to keep the appropriate documents current.

5.1.2 Requirements for an Application for a Change of Approval Holder for Schemes

The requirements in this section apply to enhanced recovery schemes, gas storage schemes, and experimental schemes. To apply to change the name of the approval holder for multiple schemes, provide a list of the approvals, including the approval number, approval type, and current approval holder. Only one application should be submitted per field for a change in approval holder for multiple scheme approvals.

An application is not required to transfer the holder of a disposal scheme approval. Upon completion of a well licence transfer for a well listed in an approved disposal scheme, the AER will issue an updated approval that aligns the approval holder with the licensee of the disposal well.

Requirements	**Comments**
1) Transfer of approval form in appendix D.	The transferor's signature is not required for corporate name changes.
2) If the present holder no longer exists, a statement attesting to that and that the proposed new holder is the proper person/ company to assume responsibility for the scheme.	

Unit 6 Gas and Ethane Removal

6.1 Background

The removal of natural gas from the province of Alberta is governed by the *Gas Resources Preservation Act* (*GRPA*). A major reason for gas removal permits is to control the amount of gas leaving the province and thereby ensure that Albertans have an adequate supply. The AER completes an annual calculation that indicates whether or not there is gas available for inclusion in gas removal permits, taking into account a 15-year supply for the core Alberta market and obligations resulting from existing gas removal permits. *Report 87-A: Gas Supply Protection for Alberta*, available from the AER Information Product Services Section, presents the AER's policies on gas supply matters. While the forms and procedures in this document have been superseded, the report continues to provide valid information regarding gas supply protection for Alberta.

As set out in the *GRPA*, there are two types of gas removal permits:

- Short-term gas removal permits involve the removal of not more than 3 billion cubic metres (m^3) of gas over a period of not more than two years. These permits may be used for any market.
- Long-term gas removal permits involve the removal of gas in volumes greater than 3 billion m^3 of gas or permit terms longer than two years. These permits are market specific and may be used only to serve the market(s) described in the applications that resulted in the permits.

6.2 When to Make This Application

Under the *GRPA*, any party wishing to remove natural gas or ethane out of Alberta must apply to the AER under section 2 of the *GRPA* for a permit to authorize such removal of gas. No AER permits are required to take propanes, butanes, pentanes, other natural gas liquids, or oil out of Alberta. No permits from the AER are required to import gas into the province.

If there are corporate changes such that the party desiring to use a permit is not the permittee named in the permit, an application must be filed to amend the permit holder name in the permit.

6.3 Applications for Gas and Ethane Removal

All applications for gas and ethane removal must be filed electronically using the Electronic Application Submission (EAS) system accessed through the Digital Data Submission (DDS) screen on the AER's website, www.aer.ca. The AER will not accept applications sent in a paper format, by fax, or by e-mail.

6.3.1 Short-Term Gas Removal Application Form

The on-line Short-Term Gas Removal Application form must be used to apply for a new permit or to amend an existing permit authorizing the removal of 3 billion m^3 or less of natural gas over a period of no more than two years.

This form, in addition to the on-line Schedule 1, must be submitted electronically using the EAS system. The AER will validate all applications to ensure that the requirements for short-term gas removal have been met. Incomplete applications or those containing errors will be closed.

The AER's practice is to allow one short-term gas removal permit per company. When the AER receives a completed application form, it reviews the information provided to determine if it is consistent with the standard AER practices and the *GRPA*, as discussed in this section. An applicant is not required to give notification to any party or advertise its intent to apply for new short-term gas removal permit or for an amendment to an existing short-term permit. The AER does not issue any notice of these applications.

If the application is acceptable, the AER approves it by electronically issuing a gas removal permit, which can be viewed through the IAR Query for 30 days after the permit is issued. The IAR Query is accessible via Quick Links and the Applications page on the AER website www.aer.ca. After the 30-day period, issued permits may be obtained by contacting the AER's Information Product Services Section at 403-297-8311 or 1-855-297-8311 (toll free).

AER publication *ST48: Alberta Gas Removal and Related Applications*, which set out new permits issued in a given month and existing valid permits, has been discontinued. Information about when and how many short-term gas removal permits have been issued can be obtained by completing a search of applications through the IAR Query.

6.3.2 Long-Term Gas Removal Application Form

The on-line Schedule 1 and the Long-Term Gas Removal Application form in appendix G must be used to apply for a new permit or to amend an existing permit authorizing the removal of natural gas in volumes greater than 3 billion m^3 of gas or for permit terms longer than two years. The form in appendix G must be printed out, filled in, scanned, and attached to the electronic long-term gas removal application.

The AER's standard practice is to allow each company to hold one long-term gas removal permit. Some companies were able to obtain numerous long-term gas removal permits prior to the AER implementing this practice. In these cases, the AER will not allow the company to obtain any further separate long-term removal permits, but will require the company to consolidate existing permits into one permit to serve the existing markets, as well as specific new markets.

When the AER receives a completed application form, it reviews the information provided to determine if it is consistent with the standard AER practices and the *GRPA*, as discussed in this section. An applicant is not required to give notification to any party or advertise its intent to apply for a long-term gas removal permit or for an amendment to an existing long-term permit. However, as a general practice, the AER publishes notice of any long-term gas removal application in major provincial newspapers as part of processing the application, since these applications may affect the public interest. If the AER receives statements of concern to an application, the AER may hold a public hearing to consider the application.

When approval of the application is granted, the AER proceeds with the steps required to issue the new long-term gas removal permit or the amendment to a long-term gas removal permit. This includes obtaining the approval of the Lieutenant Governor in Council to issue the permit.

As in the case for a short-term gas removal permit, information about when and how many long-term gas removal permits have been issued can be obtained by completing a search of applications through the IAR Query. AER publication *ST48: Alberta Gas Removal and Related Applications* has been discontinued.

6.3.3 Short-Term Ethane Removal Application Form

The on-line Schedule 1 and the Short-Term Ethane Removal Application form in appendix G must be used to apply for a new permit or to amend an existing permit authorizing the removal of ethane of not more than 3 billion m^3 of gas over a period of not more than two years. The form in appendix G must be printed out, filled in, scanned, and attached to the electronic short-term ethane removal application.

The AER's practice is to allow one short-term ethane removal permit per company. When the AER receives a completed application form, it reviews the information provided to determine if it is consistent with the standard AER practices and the *GRPA*, as discussed in this section. An applicant is not required to give notification to any party or advertise its intent to apply for a short-term ethane removal permit or for an amendment to an existing permit. However, depending on the current supplies of ethane in the province at any time, the AER may issue notice of the ethane removal permit application in major provincial newspapers as part of processing the application. If the AER receives statements of concern to an application, the AER may hold a public hearing to consider the application.

When approval of the application is granted, the AER proceeds with the steps required to issue the ethane removal permit or the amendment to an ethane removal permit. This includes obtaining the approval of the Minister of Energy to issue the permit.

As in the case for permits to remove natural gas from Alberta, information about when and how many ethane removal permits have been issued can be obtained by completing a search of applications through the IAR Query. AER publication *ST48: Alberta Gas Removal and Related Applications* has been discontinued.

6.3.4 Long-Term Ethane Removal Application Form

No application form for a permit authorizing the removal of ethane in volumes greater than 3 billion m^3 over permit terms longer than two years has been constructed, as the AER does not anticipate any requests of this type in the near term.

6.4 Reporting Natural Gas and Ethane Removed from Alberta

Upon the commencement date of a permit for the removal of natural gas or ethane, the company holding the permit, or its agent, must file a monthly report with the AER stating the volume of gas removed and other related information. The gas removal permit data are captured electronically by the Gas Removal Data (GRD) system. All parties must file data electronically; the AER will not accept any gas removal permit data in a paper format. Questions on the reporting of gas removed from Alberta may be directed to the AER at GRDAdmin@aer.ca.

6.5 Requirements for an Application for a Short-Term Gas Removal Permit

Requirements	**Comments**
1) Short-Term Gas Removal Application a) Schedule 1 b) Short-Term Gas Removal Application form	The on-line Schedule 1 and the on-line Short-Term Gas Removal Application form constitute the complete application. An applicant is not required to give notification to any party or advertise its intent to apply for a new short-term gas removal permit or for an amendment to an existing permit.
Short-Term Gas Removal Application Form	
2) For a new permit, Part A	Complete Part A of the form if you are applying for a new permit.
a) Application submission: at least two business days before the desired start date of the permit	
b) Maximum removal volume: 3 billion m^3 (including amendments)	The volume of natural gas proposed for removal from Alberta entered in Part A is to be expressed as the total removal volume in cubic metres over the entire term of the permit. This volume is not to be expressed as a daily or annual volume.
c) Maximum term: two years	An example of a two-year term is from November 1, 2012, to October 31, 2014. A permit may be made effective on the date it is issued or at some future date. However, the AER has no legislative authority to backdate a permit.

3) For an amendment to an existing permit, Part B	Complete Part B of the form if you are applying to amend an existing permit.
a) Application submission: at least two business days before the desired start date of the permit	You may apply to amend the volume, term, and/or holder of an existing permit. Only that portion of the form pertaining to the desired amendment should be filled out; e.g., if you desire to amend only the term of a permit, leave the other portions of Part B blank.
b) Maximum removal volume: 3 billion m^3 (including amendments)	If an existing short-term gas removal permit has authorized the removal of a volume of gas less than 3 billion m^3, the permit may be amended to increase the volume up to 3 billion m^3. However, if you have an existing short-term gas removal permit authorizing the removal of 3 billion m^3 of gas and you have removed that volume of gas before the permit termination date, you cannot amend the permit to take out additional volumes of gas, as the *GRPA* limits the volume allowed for removal under a short-term permit, including amendments to the permit, to 3 billion m^3. In this scenario, you must apply for a new permit.
c) Maximum term: two years	The term of a permit may be rolled to allow a further maximum term of two years, but only if the volume of gas removed under the permit and all amendments does not exceed 3 billion m^3. An example of a two-year term is from November 1, 2012, to October 31, 2014. A permit may be made effective on the date it is issued or at some future date. However, the AER has no legislative authority to backdate a permit.
d) For a request to change the named permit holder: the proposed permit holder agrees to assume and perform all the obligations and duties of the existing permit holder under the permit	

4) For the rescission of a permit, Part C

- Application submission: At least one business day prior to the desired termination date of the permit.

Complete Part C of the form if you are applying to rescind an existing permit.

Sometimes an existing permit should be rescinded at the same time a new permit is requested. For example, if you are requesting a new permit because you have removed the maximum volume of gas allowable of 3 billion m^3 before the termination of a permit and you want to continue removing gas from Alberta, you must apply for a new permit using Part A of the form. However, you should also ask for the rescission of the current permit, because the permit will remain active until it either reaches its termination date or is rescinded, even though you can no longer use it because of the volume limitation. As long as a permit is active, you must continue filing reports for that permit.

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5) Reporting Requirements

Complete the reporting requirements section of the form.

To report gas removed, the permit holder or its agent must have a DDS account. DDS Help can be accessed on the AER website, www.aer.ca.

If the person submitting the data changes after the permit is issued, system users must ensure that contact information is updated on the GRD submission form or within the Administrator Options area of the DDS system.

The electronic GRD submission form is accessed through the DDS system.

a) For each permit, file an electronic monthly gas removal permit statement with the AER by midnight on the 28th day of the month following the data month. • Statements must be filed for each permit even if no gas has been removed.	The data month is the month when the gas was delivered. If the 28th is not a business day, the deadline falls on the next business day.
b) If a third party will be submitting the monthly statements, provide the submitter information.	It is important to ensure that the correct contact information for the person submitting the data has been provided.

6.6 Requirements for an Application for a Long-Term Gas Removal Permit

Requirements	**Comments**
1) Long-Term Gas Removal Application a) Schedule 1 b) Long-Term Gas Removal Application form	The on-line Schedule 1 and the Long-Term Gas Removal Application form shown in appendix G constitute a complete application and must be used to request a new long-term gas removal permit or an amendment to an existing long-term gas removal permit. An applicant is not required to give notification to any party or advertise its intent to apply for a long-term gas removal permit or for an amendment to an existing permit.

Long-Term Gas Removal Application Form

2) Change of permit holder • The proposed permit holder must agree to assume and perform all the obligations and duties of the existing permit holder under the permit.	To request any change in the named permit holder, check the box in front of the words "Change of permit holder" and the box in front of the statement beginning "The proposed permit holder…."

	It is very important to check this agreement box, as this confirms that the proposed permit holder is fully prepared to take on the obligations of the previous permit holder with respect to the permit. The AER will not process a request to change the name on a permit unless this box has been checked.
3) Permit(s) No. to be rescinded	Complete this portion of the form only when you want to rescind an existing permit; otherwise, leave it blank.
4) Volume of gas	
a) Total volume of gas proposed for removal	If you wish to amend an existing long-term gas removal permit to add a new market with an associated new volume, fill out the "Existing volume authorized" line to reflect the volume currently authorized for removal under the existing permit. The "Proposed volume authorized" line should reflect the existing volume authorized plus the new volume to be added. The volume of natural gas proposed for removal from Alberta is to be expressed as the total removal volume in cubic metres proposed over the entire term of the permit. This volume is not to be expressed as a daily or annual volume.
b) Gas required for fuel to transport gas from Alberta • Include a description of how fuel gas has been accounted for	Normally, such gas would be accounted for in the new volumes of gas to be removed from Alberta entered on the "Proposed volume authorized" line.

5) Term of permit • If the proposed term is greater than 15 years, attach a discussion describing how the circumstances justify the requested term, including an indication as to whether the proposed gas removals could proceed under the 15-year permit and if not, why not.	If you wish to amend an existing long-term gas removal permit to add a new market with an associated new volume and the existing permit term covers the term of the new sale, fill out the "Existing term and commencement date" line on the form. Fill in the "Proposed term and commencement date" line only if the term of the existing permit does not accommodate the new market. If you are applying for a new permit, leave the "Existing term and commencement date" line blank and only fill in the "Proposed term and commencement date" line. As set out in *Report 87-A: Gas Supply Protection for Alberta*, the AER normally grants permits with a maximum term of 15 years, except in special circumstances. Therefore, if the proposed term is greater than 15 years, a discussion justifying the term is required. A permit may be made effective on the date it is issued or at some future date. However, the AER has no legislative authority to backdate a permit.
6) Name of proposed market(s), and the location and type of end-use customer(s) to be served under the permit	The name of the proposed market is the company to which the gas would initially be sold, as well as the names of any other companies that would acquire the gas prior to the final sale of the gas to the end-use customer. The location of the end-use customer is province(s) in Canada and/or state(s) in the United States. The type of end-use customer could be industrial, commercial, residential, and electrical generation markets.

7) Are arrangements in place for transporting the applied-for gas from the Alberta receipt point(s) to the intended end-use customer(s)?	If all transportation arrangements are in place, check the Yes box, and proceed to the next item. However, if some or all of the transportation arrangements are not in place, check the No box, and explain what arrangements have been made and when it is anticipated that any new facilities required would be completed. Name the pipelines ultimately leading to the end-use market, and state what has been done to ensure that transportation arrangements will be in place. While transportation arrangements do not have to be complete in order to obtain a long-term gas removal application, steps should have been taken to acquire them.
8) Provide a summary of the pricing arrangements and how they were determined for the applied-for gas. Comment on any provisions to ensure that prices continue to reflect market conditions throughout the term of the permit.	The AER does not require specific price information; however, the method of determining the price reflects whether such arrangements are in the public interest of Albertans. The AER considers prices that adapt to constantly changing conditions and reflect a fair market value throughout the term of a permit regardless of the absolute market price to be in the public interest.
9) Discuss how the applied-for removal of gas would be in the Alberta public interest.	This should be a general discussion on provincial public interest matters.
10) Attach a table in the required format of the lands/zones that would supply the permit or amended permit, including • the legal description of all of the lands involved,	The AER's policy is that a party holding a long-term permit must have sufficient gas reserves under control to supply the entire requested volume of the permit.

- the zone or zones under your company's control for the lands in question, and
- the working interest ownership under your company's control for the lands/zones.

You must supply a list of lands and zones that will supply the requested permit. Typically, a company files one corporate reserves pool (CRP) with the AER that lists the lands and zones that supply all of its AER permits. To simplify this step of the application process, an electronic file of the CRP should be set up with the AER prior to filing a long-term gas removal application. To obtain the specific format required for filing the CRP, e-mail AER Resources Applications at ResourcesApplications@aer.ca.

After setting up a CRP with the AER, request an AER Reserves Under Control Table that lists the volume of gas reserves that the AER recognizes for the specific land, zone, and working interest information provided.

Review this table carefully. If you disagree with the gas volumes listed on the AER table associated with a specific section or note that no volumes have been listed for a section, you may request that the AER review the reserves associated with the specific section. This may be done by completing the form EG-31(b)-83-1 in appendix H.

Attach appropriate isopach maps and supporting information to the form. You should have the results of any requests made in this regard on a revised AER Reserves Under Control Table prior to filing any long- term gas removal application.

If you already have filed with the AER a CPR that is serving a permit and you are applying to amend an existing long-term permit to add a new market, the CRP must have been updated within the last calendar year.

	Attach the AER Reserves Under Control Table to the application. This table must contain up-to-date data and have been produced shortly before the filing of the long-term gas removal application. The table will serve as a public record of the location of the lands that will supply the applied-for gas removal.
11) Attach a summary of the total gas reserves volume associated with the lands serving the proposed permit, together with a list of all commitments that would be served by the reserves portfolio involved, including • the proposed permit, • other permits (specify the number of each existing permit, as well as remaining authorized commitment), • intra-Alberta commitments (such as industrial, commercial, or residential contracts or corporate warranties to other companies), and • any other commitments.	The adjusted total gas volume listed on the AER Reserves Under Control Table noted in item 10 is the volume that the AER will use in determining whether you have sufficient gas reserves under control to supply the proposed gas removal. The AER will compare the total volume noted on the table against the existing obligations you have for the gas in the CRP.
12) Reporting Requirements	Complete the reporting requirements section of the form. To report gas removed, the permit holder or its agent must have a DDS account. DDS Help can be accessed on the AER website under Systems & Tools : Digital Data Submission (DDS).

	If the person submitting the data changes after the permit is issued, system users must ensure that contact information is updated on the GRD submission form or within the Administrator Options area of the DDS system. The electronic GRD submission form is accessed through the DDS system.
a) For each permit, file an electronic monthly gas removal permit statement with the AER by midnight on the 28th day of the month following the data month. • Statements must be filed for each permit even if no gas has been removed.	The data month is the month when the gas was delivered. If the 28th is not a business day, the deadline falls on the next business day.
b) If a third party will be submitting the monthly statements, provide the submitter information.	It is important to ensure that the correct contact information for the person submitting the data has been provided.

6.7 Requirements for an Application for a Short-Term Ethane Removal Permit

Requirements	**Comments**
1) Short-Term Ethane Removal Application a) Schedule 1 b) Short-Term Ethane Removal Application form	The on-line Schedule 1 and the Short-Term Ethane Removal Application form in appendix G constitute the complete application and must be used to request a new ethane removal permit or an amendment to an existing ethane removal permit. An applicant is not required to give notification to any party or advertise its intent to apply for a short-term ethane removal permit or for an amendment to an existing permit.

Short-Term Ethane Removal Application Form

2) Change of permit holder

- The proposed permit holder must agree to assume and perform all the obligations and duties of the existing permit holder under the permit.

To request any change in the named permit holder, check the box in front of the words "Change of permit holder" and the box in front of the statement beginning "The proposed permit holder…."

It is very important to check this agreement box, as this confirms that the proposed permit holder is fully prepared to take on the obligations of the previous permit holder with respect to the permit. The AER will not process a request to change the name on a permit unless this box has been checked.

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3) Permit(s) to be rescinded

Complete this portion of the form only when you want to rescind an existing permit; otherwise, leave it blank.

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4) Total volume of ethane proposed for removal

- Maximum volume: 3 billion m^3 (including amendments)

If you are applying for a new ethane removal permit, fill out the "Proposed volume authorized" line. The volume of ethane proposed for removal from Alberta must be expressed as the total volume in cubic metres proposed for removal from Alberta over the entire term of the permit. This volume must not be expressed as a daily or annual volume.

If an existing short-term ethane removal permit has authorized the removal of a volume of gas less than 3 billion m^3, the permit may be amended to increase the volume up to 3 billion m^3.

However, if you have an existing short-term ethane removal permit authorizing the removal of 3 billion m^3 of gas and you have removed that volume of gas before the permit termination date, you may not amend the permit to take out additional volumes of ethane; the *GRPA* limits the volume allowed for removal under a short-term permit, including amendments to the permit, to 3 billion m^3. In this scenario, you must apply for a new permit.

To request an amendment of an existing ethane removal permit, fill in both the "Existing volume authorized" and "Proposed volume authorized" lines.

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5) Term of permit

- Maximum term: two years

An example of a two-year term is from November 1, 2012, to October 31, 2014.

The term of an existing permit may be rolled by an amendment to the permit to allow a further maximum term of two years, but only if the volume of ethane removed under the permit and all amendments does not exceed 3 billion m^3. If you want to amend a permit to roll the term, fill in both the "Existing term and commencement date" and the "Proposed term and commencement date" lines.

A permit or an amendment to a permit may be made effective on the date it is issued or at some future date. However, the AER has no legislative authority to backdate a permit or an amendment to a permit.

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6) Name of proposed market(s), and location and type of end-use customer to be served under the permit	The name of the proposed market is the company to which the ethane would initially be sold, as well as the names of any other companies that would acquire the ethane prior to its final sale to the end-use customer. The location of the end-use customer is province(s) in Canada and/or state(s) in the United States.
7) Are transportation arrangements in place for transporting the applied-for gas from the Alberta receipt point(s) to the intended end-use customer?	If all transportation arrangements are in place, check the Yes box, and proceed to the next item on the form. However, if some or all of the transportation arrangements are not in place, check the No box, and explain what arrangements you have made and when you anticipate that any new facilities required would be completed. Name the pipelines ultimately leading to the end-use market, and state what has been done to ensure that transportation arrangements will be in place. While transportation arrangements do not have to be complete in order to obtain a long-term gas removal application, steps should have been taken to acquire them.
8) List the name and location (Legal Subdivision-Section-Township-Range, Meridian) of the facilities from which the ethane will be obtained	This includes gas processing and straddle plants.
9) Reporting Requirements	Complete the reporting requirements section of the form. To report gas removed the permit holder or its agent must have a DDS account.

	DDS Help can be accessed on the AER website, www.aer.ca, under Systems & Tools : Digital Data Submission (DDS). If the person submitting the data changes after the permit is issued, system users must ensure that contact information is updated on the GRD submission form or within the Administrator Options area of the DDS system. The electronic GRD submission form is accessed though the DDS system.
a) For each permit, file an electronic monthly gas removal permit statement with the AER by midnight on the 28th day of the month following the data month. • Statements must be filed for each permit even if no gas has been removed.	The data month is the month when the gas was delivered. If the 28th is not a business day, the deadline falls on the next business day.
b) If a third party will be submitting the monthly statements, provide the submitter information.	It is important to ensure that the correct contact information for the person submitting the data has been provided.

Unit 7 Application for Special Well Spacing

7.1 Introduction

Well spacing defines the number of subsurface drainage locations necessary to maximize oil or gas recovery from a specific pool or formation. The objectives of spacing rules are to promote conservation through efficient and orderly development of reservoirs and to protect the equity of mineral rights owners.

In accordance with section 16(1) of the *Oil and Gas Conservation Act* (*OGCA*), a working interest participant with the right to produce may, for one or more of the following reasons, apply for special well spacing that would allow for an increase in well density with more flexibility for well placement in a drilling spacing unit (DSU):

- recovery would be improved,
- additional wells are necessary to provide capacity to drain the pool at a reasonable rate without adversely affecting recovery from the pool,
- the spacing has already been substantially established in a pool, and the proposed spacing provisions are equal to or more restrictive than the established pool spacing.

Well spacing applications that do not clearly meet one of the above criteria to establish special well spacing will be closed. All applications for special well spacing must be made in accordance with *Directive 065* and must be supported by proper engineering arguments and analysis and by associated production, geological, and other engineering data.

Well spacing applications approved by the AER are displayed on the Well Spacing Map. The disposition documents for all spacing applications can be viewed for 30 days after they have been issued using the Integrated Application Registry (IAR) Query. Both the Well Spacing Map and the IAR Query can be accessed through Quick Links or the DDS system on the AER website, www.aer.ca.

7.2 Background

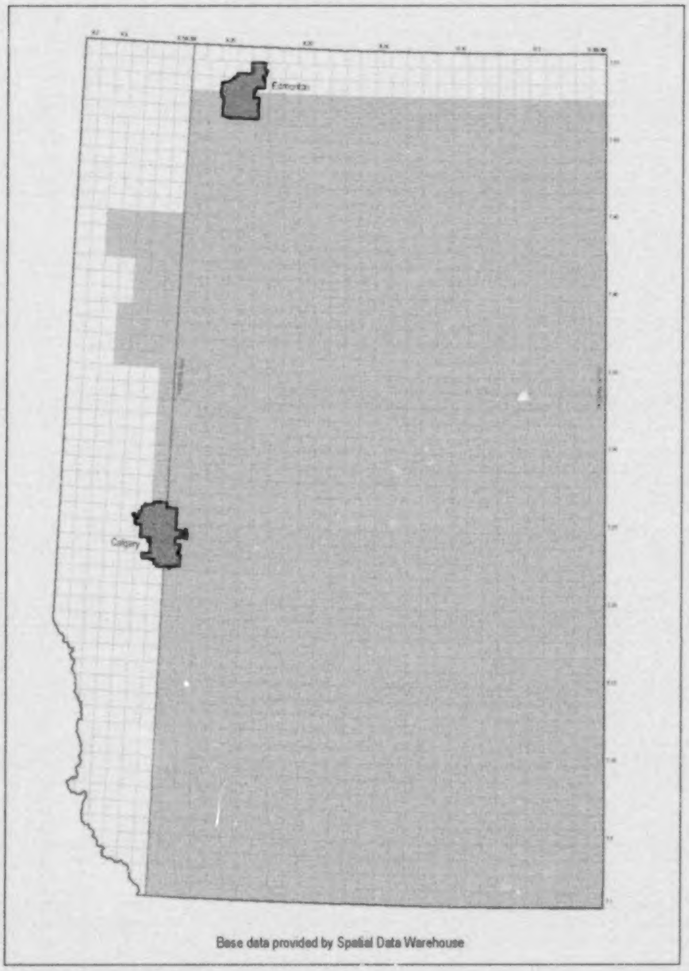
7.2.1 Standard Drilling Spacing Units, Target Areas, and Baseline Well Densities

The AER has authority under the OGCA to designate drilling spacing units (DSUs) and target areas and to make or amend rules pertaining to them.

As described in Part 4 of the *Oil and Gas Conservation Rules* (*OGCR*), the standard DSU is one section for a gas well and one quarter section for an oil well. Standard target area orientation—consistent throughout the province—is the central part of the DSU, except in gas DSUs in the area identified in Schedule 13A of the *OGCR* and shown in Figure 7.1. Target areas for standard oil and gas DSUs are as follows:

- For a gas well producing from the area shown in Schedule 13A, the target area is at least 150 m from the south and west boundaries of the section.
- For a gas well producing from areas not included in Schedule 13A, the target area is at least 150 m from all boundaries of the section.
- For an oil well producing from all areas of the province, the target area is at least 100 m from all boundaries of the quarter section.

Note that a well originally drilled on target in a DSU will always be considered on target regardless of any subsequent spacing approvals. However, the recompletion of a formation in a well that is not within its target area would be deemed off target.



Base data provided by Spatial Data Warehouse

Figure 7.1 ***OGCR*** **Schedule 13A**

Baseline well densities for standard DSUs vary depending on the substance, production source, formation, and area of the province from which oil or gas is being produced.

Gas

The baseline well density for gas production province-wide is two wells per pool per standard DSU, except that for

- coalbed methane (CBM), including coal seams with other interbedded lithologies, or for shale gas reservoirs throughout the province, there are no well density restrictions;,
- all gas zones to the base of the Colorado Group in the area outlined in Schedule 13A, there are no well density restrictions; and
- the designated strata and stratigraphic equivalents between the top of the Smoky Group and the base of the Rock Creek Member in the area outlined in Schedule 13B of the *OGCR*, as shown in figure 7.2, the baseline well density is four wells per pool per standard DSU.

Oil

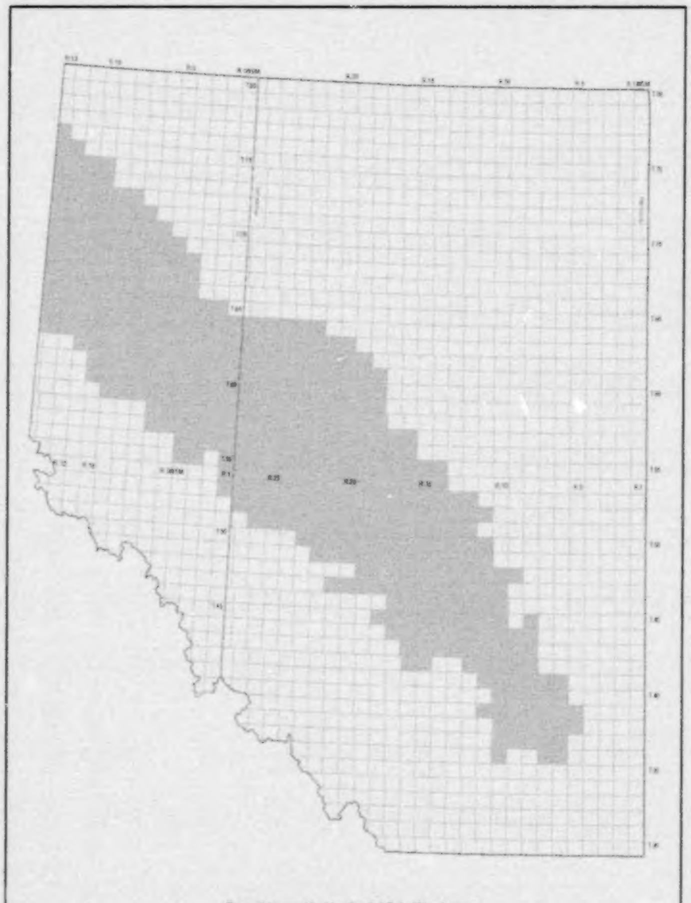
The baseline well density for oil is one well per pool per standard DSU, except that for

- the Mannville Group in Schedule 13A, the baseline well density is two wells per pool per standard DSU.

The standard DSU size of one section for gas wells and one quarter section for oil wells remains the same regardless of the baseline well density.

A block of land containing multiple, contiguous DSUs of common ownership as defined in section 1.020(2)(4) of the *OGCR* may be developed without a special well spacing approval, limited only by the standard target area on the external boundaries of that block of land, as long as the baseline well density per DSU is not exceeded for that area or strata. Figures showing examples of development on multiple contiguous DSUs of common ownership can be found in appendix L.

Any approved special well spacing supersedes standard DSUs, target areas, and baseline well densities described in Part 4 of the *OGCR*.



Base data provided by Spatial Data Warehouse

Figure 7.2 ***OGCR*** **Schedule 13B**

7.2.2 Fractional Tracts of Land

A well cannot produce from a fractional tract of land unless the tract is deemed to be a DSU.

In accordance with section 4.050(1) of the *OGCR*, a fractional tract of land that is equal to or greater than half the size of a drilling spacing unit, as described in section 4.010(3) of the *OGCR*, shall be deemed to be a drilling spacing unit without application to the AER.

In accordance with section 4.050(2) of the *OGCR*, if a fractional tract of land is less than half the size of a drilling spacing unit, it shall be joined with an adjacent drilling spacing unit and shall be deemed to be a drilling spacing unit without application to the AER if it meets the following criteria:

- the lands to be joined are of common ownership,

- the adjacent drilling spacing unit is the size of a drilling spacing unit as described in section 4.010(3) of the *OGCR*, and
- the adjacent drilling spacing unit is located directly to the east or west of the fractional tract of land.

The standard target areas and well densities for fractional tracts of land that are deemed DSUs would be in accordance with those prescribed in sections 4.021(1), 4.030(1)(a), 4.030(1)(b), and 4.030(2) of the *OGCR*.

7.2.3 Standard Buffer Zones for Holdings

The AER considers that consistent application of standard buffer zones in a region maximizes resource conservation, greatly enhances equity, and supports orderly and efficient development. Standard buffer zones for holdings are consistent with the standard target areas for oil and gas development throughout the province.

The standard buffers for holdings are noted below and are illustrated in detail in appendix L.

Area	Holding or unit	Standard buffer
13A	Gas	150 m on south and west boundaries of a holding or unit
All Alberta except 13A	Gas	150 m around all boundaries of a holding or unit
All Alberta	Oil	100 m around all boundaries of a holding or unit

Note that holding applications that are requesting a standard buffer zone along with a well density that is less than or equal to the well density allowed for by the *OCGR* will be closed. The AER will only consider well spacing applications that allow for development that cannot occur under the current spacing rules.

A well producing from a buffer zone of a holding will not be subject to enforcement if the well was drilled or spud on target on or before October 6, 2011, in accordance with the buffer zone provisions of a valid holding. In this situation, a request for a well exemption is not required in an application.

Licensees are advised to keep records to demonstrate that they were in compliance with the buffer zone provisions at the time of drilling and completing a well on or before October 6, 2011.

A well that was drilled in accordance with the conditions of a holding but subsequently produces from the buffer zone due to changes in the area of the holding may be subject to enforcement for producing from within the buffer zone. This situation may arise when an operator has an approved holding that includes multiple DSUs and drills a well along the boundary between the DSUs within the holding. If the operator does not retain the mineral lease for the approved zone in the DSU adjacent to the well, the holding is realigned to reflect common ownership. Realignment of the holding boundaries would place the well within the buffer zone, causing the well to be in noncompliance. The well licensee is responsible for maintaining common ownership within each holding to ensure that no buffer issues occur.

7.2.4 Spacing and Horizontal/Multilateral Wells

The productive part of a horizontal wellbore in each DSU is considered a wellbore for the purpose of section 4.021 of the *OGCR*. The productive part of a wellbore is the portion open to the producing zone or formation/pool. Each leg of a multilateral horizontal well counts as a wellbore, as shown in figure 7.3.

If any productive portion of the horizontal wellbore is off target, the entire horizontal well is considered off target and a penalty may be applied to the well's total production.

A horizontal well may be drilled across adjacent DSUs that have common mineral rights ownership at both the lessor and lessee levels or if a pooling agreement between the lessee(s) and lessor(s) is in place, as shown in figure 7.4. In such cases, a spacing application is not required as long as the well density does not exceed the current baseline well density.

The example in figure 7.3 shows two lateral legs and one vertical leg producing within a DSU. Assuming that all legs are producing from the same pool, this DSU would have three producing wells.

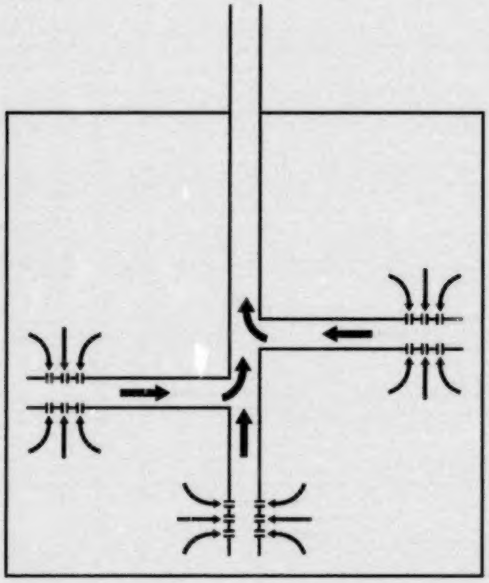


Figure 7.3 Example of producing horizontal/multilateral legs from a single DSU

If a horizontal well is drilled from target area to target area between DSUs of identical size, target area configuration, and mineral rights ownership, the corridor between target areas is deemed "on target." However, if any productive portion of the horizontal wellbore falls outside this corridor, the entire horizontal wellbore is considered off target and a penalty may be applied to the well's total production. Assuming that the horizontal well in this example is producing from the same pool in each quarter-section DSU, the well count would be one well per DSU. Although the example illustrates only oil DSUs with central target areas, the rule also applies to the gas DSUs for both central target and corner target areas.

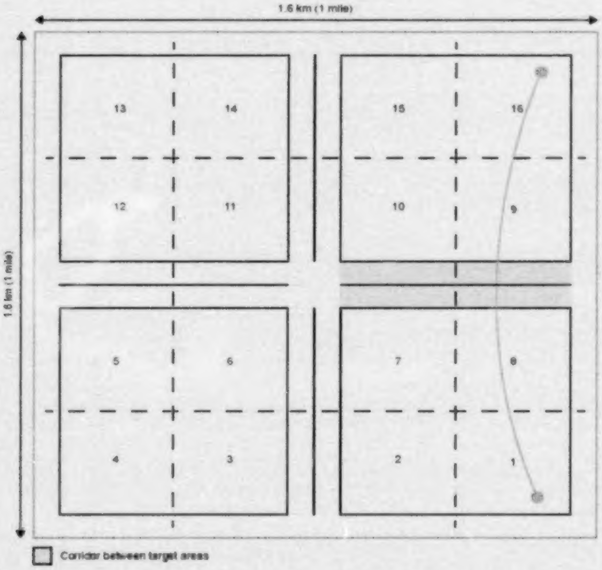


Figure 7.4 Example of a horizontal oil well drilled across adjacent quarter-section DSUs of common mineral rights ownership

7.2.5 When to File a Spacing Application

An operator wishing to develop using well densities that deviate from the standards prescribed in Part 4 of the *OGCR* must apply to the AER and obtain approval for the special spacing before beginning production. The following conditions apply:

- Applications for special well spacing must contain information that fully and clearly supports the proposed change in spacing.
- Applications for well spacing must meet the *OGCR* criteria for establishing special well spacing and must clearly support the entire area of application.
- Applications that do not meet the criteria for special well spacing will be closed, and those containing minimal or insufficient information to support all applied-for lands will be closed.

7.2.6 How to Make a Spacing Application

A spacing application must be filed electronically using the Electronic Application Submission (EAS) system via the Digital Data Submission (DDS) system on the AER website, www.aer.ca. The AER will not accept paper applications. The application must be made using the appropriate Spacing Application form (see appendix I, "EAS Well Spacing Application Forms & Explanatory Notes"), which is interactive with the Well Spacing Map. This form, in addition to Resources Applications Schedule 1 and the required attachments, must be included in the application. A well spacing application filed with the AER is displayed on the Well Spacing Map following registration.

The AER validates all applications to ensure that the application requirements have been met. Incomplete applications, those containing numerous or significant errors, or those in which data is not provided in International System of Units (SI) will be **closed**.

If the AER finds that any question on the Spacing EAS form is answered incorrectly at the time of registration, the application will be **closed**.

If an application contains more than 36 sections or the equivalent in size or the applied-for formations and provisions are not the same for each area of application, the application will be **closed**.

7.2.7 Types of Spacing Applications

7.2.7.1 Holding Application

Common mineral rights ownership at both the lessor and lessee levels is a prerequisite for establishing a holding. A holding area must consist of at least one DSU or whole, contiguous DSUs of common mineral ownership.

A holding application is made in accordance with section 5.190 of the *OGCR*, which allows for the establishment of a holding, and section 79(4) of the *OGCA* to suspend the DSU and target area provisions for the holding areas. The suspension of DSU and target area provisions affords the greatest flexibility to locate wells when increasing the well density.

A request to suspend DSUs and target areas within a holding must include a proposed well density and a buffer zone distance between a well and the boundary of the holding area. A minimum distance between wells within the holding area is not a mandatory provision but may also be considered.

Initial development plans should be considered when determining the size of an area of application. Applicants who file holding applications solely based on contiguous blocks of land containing common ownership risk future noncompliance if there is a change in mineral ownership.

Note that wells drilled in accordance with the holding boundaries could be considered off-target if the holding is rescinded and they were not drilled in accordance to the DSU and target areas, or they could be in noncompliance if the holding boundaries are realigned and they are now producing from a buffer zone. For these reasons it is very important that an applicant only file holding applications for lands that they have immediate plans to develop.

7.2.7.2 Special DSU Application

The use of holdings provides for maximum flexibility to support development plans. If a need for increased well density is identified, holding applications should be filed. However, DSUs that are subject to a compulsory pooling order do not qualify for a holding, and in these very unique cases a special DSU application may be filed to increase well densities beyond those prescribed in the *OGCR*.

Divided mineral ownership within a DSU is not a reason to file a special DSU application. If the mineral owners are unable to voluntarily negotiate a pooling arrangement, a Compulsory Pooling application may be filed with the AER.

Applications for special DSUs will only be considered by the AER in unique situations. Therefore, an applicant wishing to file a special DSU application should contact the AER Resources Applications Group before filing.

Standard target areas must be requested when filing a Special DSU application.

7.2.7.3 Rescinding a Special DSU

Under section 4.040(5) of the *OGCR*, an applicant may apply to rescind an existing approved special DSU. A request to rescind a special DSU must be made using the Rescind form. Rescinding a special DSU is necessary if an applicant wishes to use the standard DSUs and target areas set out in the *OGCR* to develop its minerals.

All mineral owners (excepting the Crown) within the area of application must be notified before filing a Rescind Special DSU application.

A Rescind Special DSU application must create whole contiguous standard drilling spacing units.

7.2.7.4 Rescinding a Holding

Under section 5.220(b) of the *OGCR*, an applicant may apply to rescind all or part of an existing approved holding. A request to rescind a holding must be made using the Rescind form. Rescinding all or part of a holding may be necessary if common ownership no longer exists (also see section 7.3.1.6). A common example of such a situation is when a lease for a DSU within a holding boundary has expired and reverted back to the Crown. All of an existing approved holding may also be rescinded if the standard spacing prescribed in Part 4 of the *OGCR* is sufficient.

Applications to remove DSUs from holdings may only be filed for areas where the applicant has a working interest and wishes to rescind all or part of the holding in favour of the standard spacing specified in Part 4 of the *OGCR* or where a lease has expired and reverted back to the Crown. Applications to rescind holdings must be filed on behalf of all working interest owners except where the lands have reverted to the Crown.

There are no notification requirements for an application to rescind a holding.

7.2.7.5 Modify Holdings

A Modify application form must be filed when mineral ownership within an approved holding boundary is no longer common and the boundaries of the holding need to be realigned to reflect the new area of common ownership. Notification is not required when re-aligning holding boundaries. Applicants applying to realign holding boundaries are required to submit a Declaration of Common Ownership form. Note that lands that have reverted back to Crown cannot be rescinded using the Modify form, rather they must be rescinded using the Rescind application form. Applicants applying to realign the boundaries of a holding to reflect common ownership and to rescind lands that have reverted back to Crown must file two applications and relate them on Schedule 1 of the EAS forms.

A Modify application form should be used to remove an interwell distance provision from an existing holding and/or to amend the buffer zone of a holding to reflect the standard buffer zone for the area. This type of request would have to meet the minimum notification requirements of *Directive 065*, section 7.3.1.

Note that Modify spacing applications that are requesting a standard buffer zone and for which the approved well density is less than or equal to the well density allowed for by the *OCGR* will be closed. In such situations, the holding should be rescinded.

Requests to increase the well density in an area cannot be filed using the Modify spacing application form.

7.3 Application Requirements and Expectations

7.3.1 Minimum Notification Requirements

Well spacing applications that have not met all applicable notification requirements will be closed and removed from the AER's agenda. Applications to rescind holdings or re-align holding boundaries have no notification requirements.

Refer to the Notification Guidelines section of *Directive 065* for a detailed discussion on the objective, purpose, and guidelines of the notification process.

7.3.1.1 Preapplication Notification

Applicants must conduct preapplication notification. A minimum 15-business-day response period from the date the notification letter is mailed is required. An application filed with the AER before this notification period has expired will be closed.

7.3.1.2 How to Notify

Applicants must use applicable notification template letters (see appendix J, "Spacing Notification Templates") and must provide an accurate description of the entire area of application, proposed formations/pools, and requested provisions.

7.3.1.3 Whom to Notify

At a minimum, applicants must notify the following:

- All mineral lessees of oil, gas, and coal that are within the applied-for formations/pools in the application area and within one quarter section of the application area for oil applications and within one section for gas applications surrounding, regardless of provincial boundaries. Notification must be conducted using the Lessees and Unleased Freehold Notification Letter Template in appendix J.
- Any leased individual Freehold mineral owners of oil, gas, and coal that is within the applied-for formations/pools in the application area and within one quarter section of the application area for oil applications and within one section for gas applications, regardless of provincial boundaries. (This notification is for information purposes only, and to support ongoing dialogue between the lessee and the Freehold mineral rights owner.) Notification must be conducted using the Leased Individual Freehold Notification Letter Template in appendix J.
- Any Freehold mineral owners of oil, gas, and coal for which mineral rights in the applied-for formations/pools are unleased within one quarter section of the application area for oil applications and within one section for gas applications surrounding the application area regardless of provincial boundaries. Notification must be conducted using the Lessees and Unleased Freehold Notification Letter Template in appendix J.

  Note that for applications to rescind a special DSU, mineral owners notification must be conducted within the area of application only.

If any of the above applicable parties are not notified, the applicant must provide an explanation in the Reason for Incomplete Notification attachment.

Notification to the Crown is not required for any well spacing application.

7.3.1.4 Evidence of Notification

Applicants are not required to provide evidence of notification upon registration of a well spacing application, but they are required to attach a Declaration of Notification (see appendix N).

The AER may request evidence of notification for any well spacing application. It is the responsibility of the working interest owner who filed the application to keep the evidence on file. Evidence would include the following:

- Letters used for notification of the application.
- A list of the mineral owners notified (do not provide names of individual Freehold mineral owners in this list unless requested by the AER; see the Mineral Rights Ownership and Notification List example in appendix K, "Special Well Spacing Attachment Examples"). The percentage of working interests must be specified for mineral owners within the area of application.

Applications that include evidence of notification other than the required Declaration of Notification form will be closed except where that information has been specifically requested by the AER for an application.

Notification that is less than a year old is considered valid as long as the mineral owners in the notification area remain the same. If there is any change to mineral ownership, the new mineral owners must be notified of the application and given 15 business days to respond before an application may be filed with the AER.

7.3.1.5 Outstanding Statements of Concern

All outstanding statements of concern, written and verbal, must be included in the application filed with the AER. In the case of a Freehold individual, the statement of concern and any related material filed must not contain confidential or sensitive personal information (e.g., medical history, financial or family issues) unless the individual whom the information is about has consented to it being provided to the AER for filing on the public record. If an individual does not provide consent, applicants should discuss with AER staff what information should be included with the application to reflect the concerns of that individual. In collecting personal information and providing it to the AER, applicants must also comply with all personal information protection legislation to which they are subject.

The application must include an explanation of how the applicant has addressed the unresolved concerns and the applicant's view of how the AER should proceed with the application.

7.3.1.6 Common Ownership

As defined by section 1.020(2)(4) of the *OGCR*, holdings require common ownership at both the lessor and lessee levels in the area of the holding. Common ownership must be maintained to ensure the validity of and preserve the equity within a holding. A farm-in or farm-out agreement has the potential to change the ownership so that it is no longer common throughout the area of a holding.

If the ownership within a holding is common at the lessor level and uncommon at the lessee level but all lessees have agreed to work within the terms of the current holding, the ownership is considered to be common for the purposes of a holding. Such agreements are handled by the mineral owners and are dealt with outside of AER procedures. Lessees are responsible for managing these agreements to mitigate any potential risk of noncompliance. In situations where the area of a holding is greater than a single DSU and there are both Freehold and Crown lessors, the ownership is not considered to be common and separate holdings must be created.

All well spacing applications to establish or modify holdings require a Declaration of Common Ownership attachment (see appendix N).

To prepare for the possibility of an audit, the working interest owner who filed a spacing application must keep a record of the mineral ownership information at the time of application. This information would include

- the lessee map,
- the lessor map, and
- the mineral ownership and notification list

Templates for this information can be found in appendix K. Applications that include evidence of common ownership other than the required Declaration of Common Ownership form will be **closed** except where that information has been specifically requested by the AER for an application.

7.3.2 Minimum Equity and Conservation Requirements

An application for new holdings or increased well density within a DSU must include the following:

- A detailed discussion on how the current spacing does not allow for initial development. Standard well spacing is often sufficient for initial resource development and collection of critical information on both the existence and quality of the applied-for resource. This information assists in determining whether additional infill drilling is needed to optimize conservation and recovery of the resource.
- A detailed discussion on how the proposed spacing will affect hydrocarbon recovery.

- A summary of the data analysis and a detailed discussion on how the well information provided in the Well Productivity and Volumetric Data form supports the proposed spacing (see section 7.6.3). Note that if an applicant plans to develop using horizontal wells, the information provided must be from horizontal wells if available. If this information is not available, explain how the vertical well data provided in the application supports the proposed horizontal development.
- In areas for which limited production data is available, the applicant must provide geological evidence of the applied-for resource (i.e., oil or gas) being present throughout the entire area of application and of the quality of the reservoir (e.g., geological cross sections, geological analysis, and structural and net pay isopach mapping). Also, a discussion must be provided to explain how the information provided applies to the application area.
- A written statement that the applicant has the petroleum and/or natural gas rights for all applied-for zones within the application area.
- If the application is for heavy oil, a fluid analysis specifying the oil density of the native reservoir fluid.

Any additional information to fully support the well spacing application should also be included, such as

- pressure information,
- geological discussion,
- geological cross-sections,
- topographical mapping,
- net pay isopach mapping, and
- development plans (specific locations and timing to drill; type of drilling—pad, horizontal, vertical).
  - If development plans are provided, a discussion is required as to what will drive the decision to drill additional wells in the DSU within the area of application. If it is based on the results of the first well in the DSU and that well was not drilled within the area of application, then the application may be premature and consideration should be given to filing the application after the decision to drill further wells has been made and supporting production data can be provided.

An analysis of all data provided in support of an application must also be submitted with the application.

Applications for special well spacing must clearly meet the criteria in section 5.190(3) of the *OGCR* to establish special well spacing, and the information provided must clearly support the entire area of application. Applications that do not contain information to meet the criteria for special well spacing or that contain minimal or insufficient information to support all applied-for lands will be **closed**.

All data provided in the application must be presented in International System of Units (SI). Applications containing information not in SI units will be closed.

7.3.3 Production Information and Volumetric Reserves Requirements

7.3.3.1 Commingled Production

The minimum regulatory requirements for well testing within a development entity (DE) do not provide for production information necessary to properly assess the optimum spacing for a specific pool or formation. When commingling production in an area where increased well densities are needed, collection of appropriate production and reservoir data is required to support changes in well spacing.

When applying for special well spacing in areas where commingled production has been approved or is occurring within a DE, an applicant must provide production information for each formation/pool being applied for. Segregated production data are best, but where formation-specific production information is not available, other sources or means of determining production information may be used (e.g., allocation of production contributions derived from spinner log surveys; production from nearby control wells).

The applicant must ensure that the correct well spacing is in place for all producing formations/ pools within a DSU where commingled production is occurring.

7.3.3.2 Production Information Requirements

Production information for each applied-for formation or pool is required for applications proposing a change in well spacing. Selected wells must represent the typical performance within and/or surrounding the application area and have production from the formation, substance (i.e., oil or gas), and production source (i.e., sands or coals) being applied for. Where an applicant plans to develop using horizontal wells, the information provided in support of the application must be from horizontal wells or the applicant must provide a discussion explaining how the vertical well data used in the application supports the proposed horizontal development. All applications for both vertical and horizontal development must include a discussion of the provided production data explaining how that data supports the proposed spacing change.

All production information supplied in support of an application must be provided using the EAS Production form. Consider the following when filling out a Production form:

- The Production form allows for auto-population of AER production data upon entering a well licence number and selecting the Unique Well Identifier (UWI) applicable to the application.
- AER production data should be revised in the Applicant Data section of the form if the auto-populated data are not current or correct.
- In the case of a commingled well, the name of the producing formation must be entered, and production data for each applied-for formation are required.
- If providing production information for a formation based on allocation, the methodology used to determine the allocation for each applied-for formation in the wellbore must be included. Refer to section 7.6.3.2 for further details on required production information.

Production information is not required for applications to rescind holdings, rescind special DSUs, re-align holding boundaries, remove interwell distances, or amend the buffer zones to the standards of the area.

7.3.4 Reserves Information Requirements

Based on the technical complexity of an application, the AER may require reserves information and performance data to support a change in well spacing. Where required, applicants must provide reserves data and recoverable reserves estimates from wells representative of the application area. The application must include a discussion of the reserves information provided and detail how the data support the proposed spacing change.

Where an applicant plans to develop using horizontal wells, the reserves information provided in support of the application must be from horizontal wells if available or the applicant must provide a discussion explaining how the vertical well data used in the application supports the proposed horizontal development.

All reserves information provided in support of an application must be provided using the EAS Volumetric Data form. All production plots and decline analysis for wells for which volumetric reserves data have been provided must be included in the "Production Decline Plot and Analysis" attachment.

Where horizontal well data is provided, the applicant must adjust the DSU area and the estimated ultimate recoverable reserves (EUR) to account for the entire productive portion of the horizontal wellbore. The application document must clearly explain how the values in the Volumetric Data form were derived.

Refer to section 7.6.3.2 for further details for volumetric reserves information.

7.4 How the AER Processes the Application

The AER processes special well spacing applications along three risk-based processing paths: quick, standard, and nonstandard, having regard for

- location of the proposed application areas relative to previously approved spacing for the same formations and substance,
- proposed provisions, and
- available production and reservoir information.

The processing path may change if the AER finds that additional information is required to technically support the application.

The minimum requirements for an application that meets the quick application path criteria are significantly fewer than those for a standard and nonstandard path application. Therefore, it is beneficial to analyze development plans before preparing and submitting a special well spacing application.

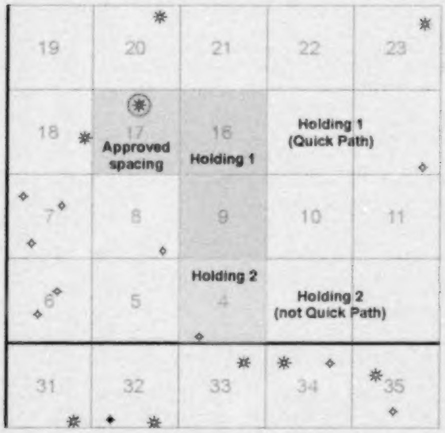
7.4.1 Quick Application Path

Well spacing applications that meet **all** of the baseline criteria outlined below and clearly meet all Directive 065 requirements qualify to be processed in an expedited manner using a quick application path. The review emphasis for quick path applications shifts from the reservoir's behaviour in the application area to behaviour in the adjacent previously approved and developed DSU.

Minimum Baseline Criteria for the Quick Application Processing Path

1) Each applied-for holding within the application area must be adjacent to an existing approval. See figure 7.5.
2) Each standard DSU in the area of application must be adjacent to a DSU that has approved spacing and proven production information from a well in the applied-for formation(s).
3) The applied-for well density must be less than or equal to the approved well density.
4) Proposed well densities must be no more than two wells per pool per quarter section for oil and four wells per pool per section for gas.
5) Standard buffer zones must be proposed.

Applications that are filed in the quick application pathway but that do not meet all the baseline criteria for the quick application path will be **closed**.



▨ Approved spacing

⊛ A well in Section 17 could justify proposed spacing in Sections 9 and 16, if it has production data from the applied for formation(s)/pool(s). DSUs that are diagonal to approved spacing are considered to be adjacent.

Holding 2, in Section 4, does not have a well in the adjacent approved DSU and does not meet the quick application path criteria.

Figure 7.5 Quick application path

7.4.2 Standard Application Path

If the application does not meet the quick application path criteria, it must meet **all** of the following minimum baseline criteria to be processed on the standard application path:

Minimum Baseline Criteria for the Standard Application Processing Path

1) Any part of a holding must be within three standard DSUs of an existing approval. See figure 7.6.

2) There must be proven production information from the applied-for formation(s)/pool(s) in each proposed holding/unit.

3) The applied-for well density must be less than or equal to the approved well density.

4) Proposed well densities must be no more than two wells per pool per quarter section for oil and four wells per pool per section for gas.

5) Standard buffer zones must be proposed.

Wells submitted in the application must have enough production history to allow for the submission of volumetric reserves data that can clearly support the need for the requested special well spacing throughout the entire area of application. Additional production and volumetric reserves information from producing wells in surrounding areas should also be included to fully support an application.

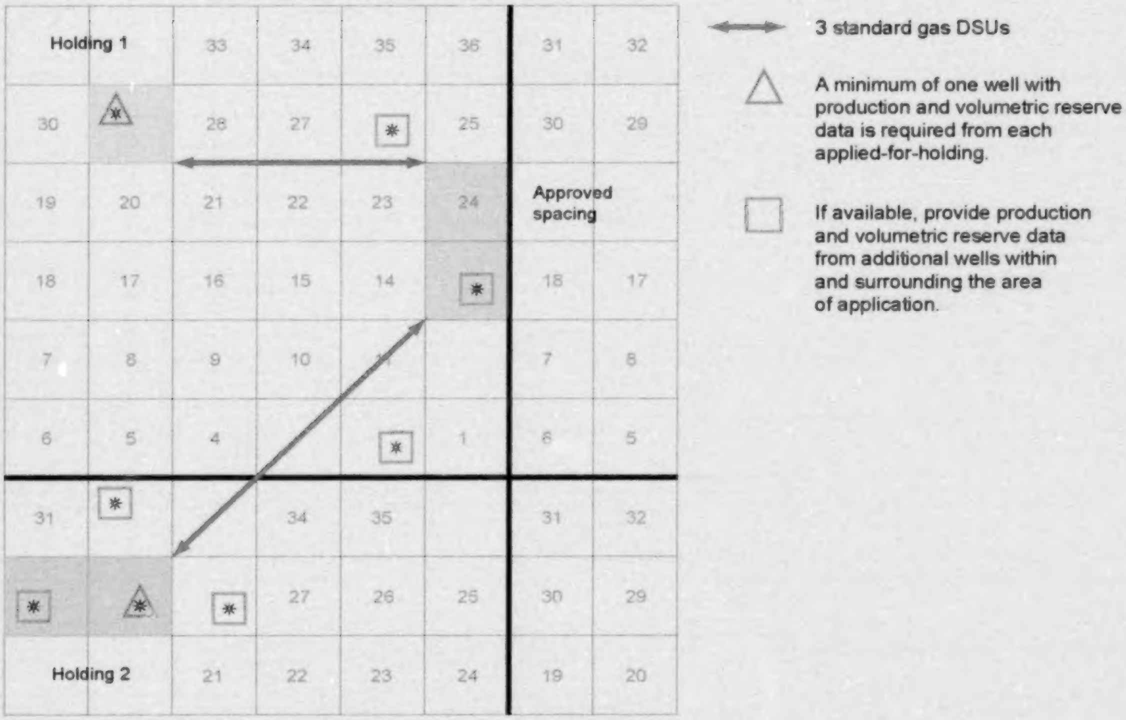

Holding 1
33
34
35
36
31
32
30
28
27
25
30
29
19
20
21
22
23
24
Approved spacing
18
17
16
15
14
18
17
7
8
9
10
11
7
8
6
5
4
1
6
5
31
34
35
31
32
27
26
25
30
29
Holding 2
21
22
23
24
19
20
3 standard gas DSUs
A minimum of one well with production and volumetric reserve data is required from each applied-for-holding.
If available, provide production and volumetric reserve data from additional wells within and surrounding the area of application.

Figure 7.6 Standard application path

7.4.3 Nonstandard Application Path

Applications not meeting the quick or standard application path criteria are processed on the nonstandard application path. Such applications typically propose complex or innovative spacing requiring more detailed analysis. Production and volumetric reserves data should be supplied from wells that have enough production history to allow for the submission of volumetric reserves data that can clearly support the need for the requested special well spacing throughout the entire area of application. These wells can be within and/or surrounding the applied-for area.

In some cases the AER may find it necessary to gather more data to support the optimum spacing for a resource. In such cases, an application may be approved as a test area and the applicant is required to follow up with the AER to validate reservoir interpretation, assess performance predictions and, if necessary, manage unintended consequences.

7.4.4 Processing Paths for Different Spacing Application Types

The following shows the possible processing paths used for the different types of well spacing applications.

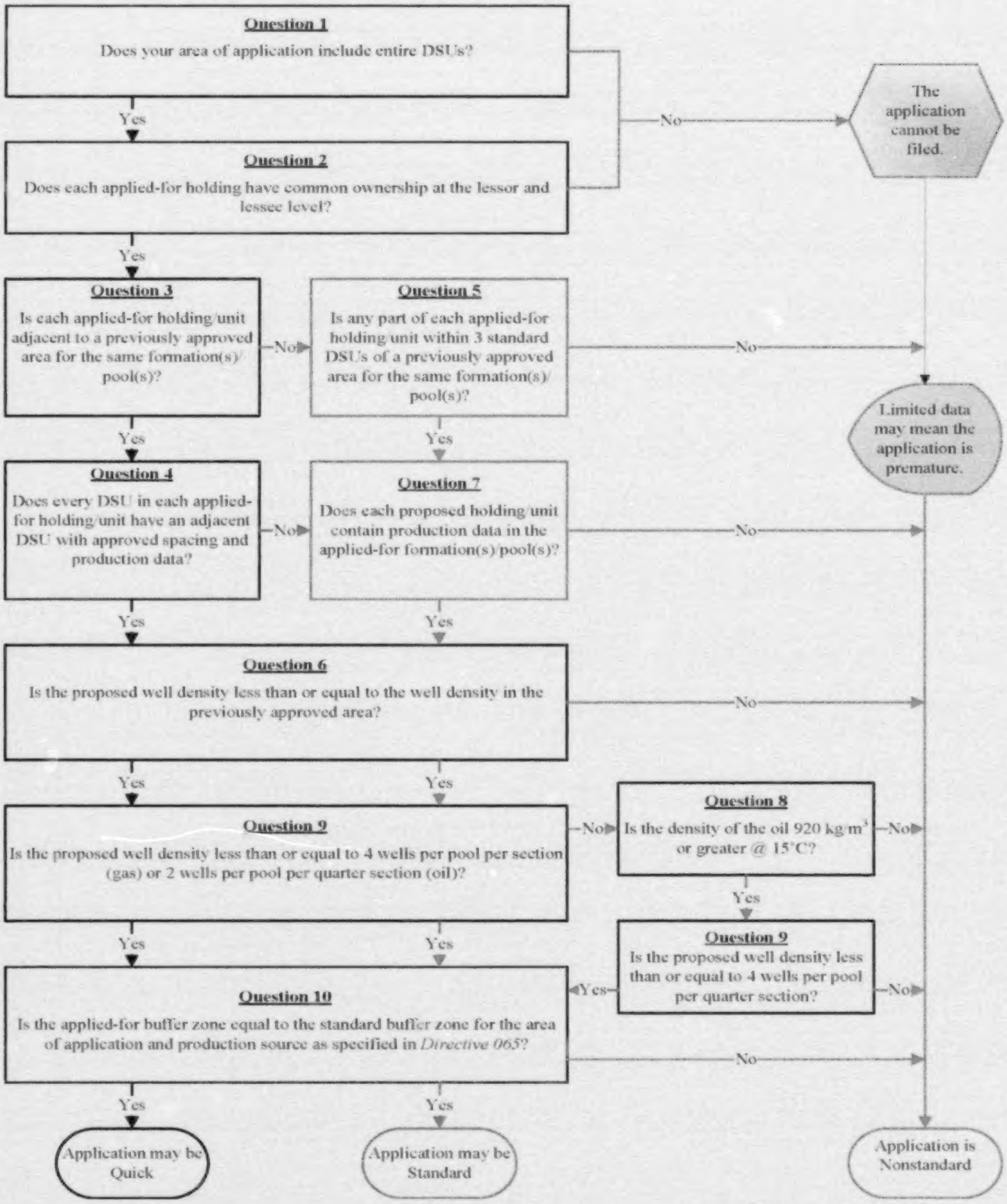
Holding/unit	Special DSU	Modify holding	Rescind holding	Rescind special DSU
Quick		Quick	Quick	Quick
Standard				
Nonstandard	Nonstandard			

7.4.5 Applications with Outstanding Objections

Any application with an outstanding statement of concern requires additional review, regardless of the processing path criteria met.

7.4.6 AER Spacing Application Decision Tree

Figure 7.7 outlines the AER decision process for holding applications.


Question 1
Does your area of application include entire DSUs?
Yes
No
The application cannot be filed.
Question 2
Does each applied-for holding have common ownership at the lessor and lessee level?
Yes
Question 3
Is each applied-for holding/unit adjacent to a previously approved area for the same formation(s)/pool(s)?
No
Question 5
Is any part of each applied-for holding/unit within 3 standard DSUs of a previously approved area for the same formation(s)/pool(s)?
No
Limited data may mean the application is premature.
Yes
Yes
Question 4
Does every DSU in each applied-for holding/unit have an adjacent DSU with approved spacing and production data?
No
Question 7
Does each proposed holding/unit contain production data in the applied-for formation(s)/pool(s)?
No
Yes
Yes
Question 6
Is the proposed well density less than or equal to the well density in the previously approved area?
No
Yes
Yes
Question 9
Is the proposed well density less than or equal to 4 wells per pool per section (gas) or 2 wells per pool per quarter section (oil)?
No
Question 8
Is the density of the oil 920 kg/m³ or greater @ 15°C?
No
Yes
Question 9
Is the proposed well density less than or equal to 4 wells per pool per quarter section?
Yes
No
Yes
Yes
Question 10
Is the applied-for buffer zone equal to the standard buffer zone for the area of application and production source as specified in Directive 065?
No
Yes
Yes
Application may be Quick
Application may be Standard
Application is Nonstandard

Standard buffering for oil

100 m on all boundaries of the holding(s).

Standard buffering for gas

Outside 13A: 150 m on all boundaries of the holding(s).

13A: 150 m on the south and west boundaries of the holding(s).

Figure 7.7 AER decision tree for holding/unit applications

7.5 Attachments Required for a Special Well Spacing Application

Table 7.1 provides a list of common attachment types related to a spacing application. The EAS system will prompt for mandatory attachments, which depend on the type of spacing application being filed and on selections made on the spacing forms.

The content in each attachment must represent the attachment type and associated description; otherwise the application will be closed.

Table 7.1 EAS attachment types

EAS attachment type	Description
Application	Application requirements described in *Directive 065*.
Declaration of Common Ownership	A signed copy of the *Directive 065* Declaration of Common Ownership form.
Declaration of Notification	A signed copy of the *Directive 065* Declaration of Notification form.
Production Decline Plot and Analysis	Production decline plot(s) and analysis.
Statement(s) of Concern	Documentation of statement(s) of concern.
Isopach Map	Net oil and/or gas pay map.
Applicant Response to Objection	Written response by applicant to intervener.
Material Balance Reserves	Material balance reserves, including existing and projected recovery factors, recoverable reserves, and data used to determine estimates.
Miscellaneous	Miscellaneous attachments in support of the application.
Fluid Analysis	An analysis of the native reservoir fluid, including the oil density.
Pressure History	A tabulation of pressure history of the subject pool.
Reason for Incomplete Notice	An explanation of why *Directive 065* notification requirements were not met.

7.6 Explanatory Notes for Application Form Questions

The spacing application forms and explanatory notes for each application type are in appendix I. The numbering below corresponds to the questions on the forms.

7.6.1 Schedule 1—Resources Applications

All spacing applications must include Schedule 1—Resources Applications. You must select as an application type either Spacing: Gas or Spacing: Oil. Once selected, the Application Purpose field is enabled, and from the drop-down list you must select one of the following application purposes:

- New Spacing—to apply for a new area of spacing or to amend areas and/or provisions of previously approved spacing.
- Rescind Spacing—to apply to remove existing approved holdings and revert to the underlying DSUs and target areas or to remove special DSUs and revert to the standard DSUs and target areas.
- Modify Spacing—to re-align holding boundaries to reflect current mineral ownership, change buffer zones to reflect the standard buffer zone for the area, and/or remove the interwell distance from an existing holding. Note that a modify spacing application cannot be used to increase well densities.

In Schedule 1, Section 3: Locations; Section 4: Field and Pool List; and Section 5: Ownership and Notification Information, questions 2, 2a, and 3 are not required for well spacing applications.

7.6.2 Spacing Form

7.6.2.1 Notification Requirements

There are no notification requirements for applications to rescind holdings or to re-align holding boundaries to reflect common mineral ownership.

1) Were *Directive 065* notification templates used?

Select YES if all parties were notified using the appropriate notification templates (see appendix J).

If you select NO, your application cannot be filed. *Directive 065* notification templates must be used.

2) Have all parties been notified in accordance with *Directive 065*?

Select YES if all parties were contacted (see section 7.3.1.3).

Select NO if this requirement has not been met but you are still choosing to file a spacing application. You must include a "Reason for Incomplete Notification" attachment with your application.

3) What was the mailing date of the last notification letter sent?

Enter the date the last notification letter was sent. A minimum 15-business-day response period from the date the notification letter is mailed is required before an application can be registered with the AER.

4) Are there any outstanding objections or concerns?

Select YES if there are unresolved concerns or objections from one or more parties.

Select NO if there are no known unresolved concerns about the application.

5) Is the application consistent with the details in the notification?

Select YES if the application area, formation(s)/pool(s), and proposed provisions in the application are consistent with those stated in notification letters.

If you select NO, you must include an explanation in the application attachment. If the AER finds that the details of the application were not properly outlined in the notification letters, the application may be closed.

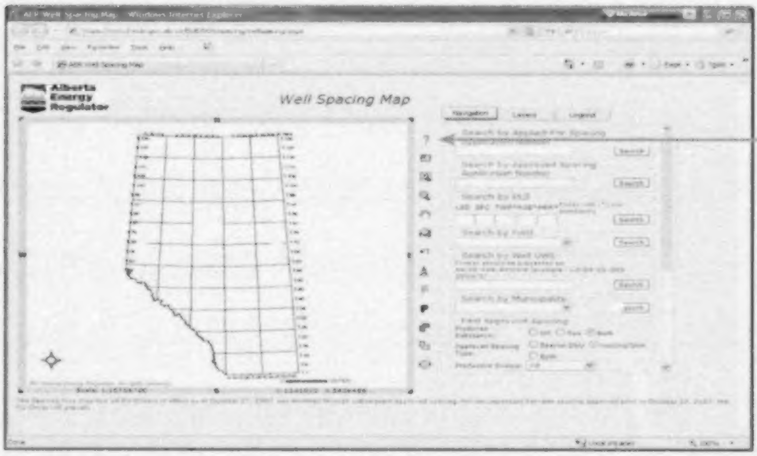
7.6.2.2 Application Type

Select one of the following:

Special application type	**Description**
Holding or unit	
Holding	Establish a holding comprising whole contiguous DSUs in accordance with sections 5.190 and 5.200 of the *OGCR* and suspend the DSUs and target areas in the holding in accordance with section 79(4) of the *OGCA*.
Unit	Suspend the DSUs and target area provisions within a unit or partial unit in accordance with section 79(4) of the *OGCA*.
Special DSU	Change the surface area of a DSU, in accordance with section 4.040(1) of the *OGCR*, or increase the number of wells to be produced in a DSU, in accordance with sections 4.021(1) and 4.040(1) of the *OGCR*.

7.6.2.3 Area of Application

To select your application area and applied-for formation(s) or pool(s), click View Map to open the Well Spacing Map window. For information on how to do this, see Online Help Link.



Online help

7.6.2.4 Application Details

1) What is the source of production?

Select the production source—either sand or coal. Only one production source can be selected for each application. If application areas involve both production sources, you must file multiple applications and relate them on Schedule 1 in section 6.

Should your application be for the production of shale gas, select a production source of sand. Specify in the application attachment type that the proposed spacing is for the production of shale gas and meets the shale gas definition in *Bulletin 2009-23: Shale Gas Development—Definition of Shale and Identification of Geological Strata*.

7.6.2.5 Spacing Application Forms

Spacing EAS forms and explanatory notes for each application type can be found in appendix 1.

7.6.3 Well Productivity and Volumetric Data Form

No well productivity or volumetric reserves information is required for applications to rescind a holding, to rescind a special DSU, or to modify a holding.

7.6.3.1 Required Production and Volumetric Data

Production and volumetric reserves data for each applied-for formation or pool is required as follows:

Quick application path: Production data is mandatory from an adjacent DSU for each DSU in the area of application. The production data must be from all applied-for formations and within a previously approved area of spacing. Production and volumetric reserves data within the application area are not required. (See section 7.4.1.)

Standard application path: Production and volumetric reserves data within each contiguous area of application or each applied-for holding/unit are mandatory. (See section 7.4.2.)

Nonstandard application path: Production and volumetric reserves data from either within the application area or outside the application area are mandatory. (See section 7.4.3.)

7.6.3.2 Populating the Well Productivity and Volumetric Data Form

Selected wells should represent the type of development being proposed (e.g., vertical or horizontal wells) and typical performance in the area. The selected wells should have production information from each formation/pool and substance being applied for. Once you have opened the Well Productivity and Volumetric Data form, select "Add Well." This will bring you to the Well Productivity Details page, where you will enter the well licence number and select the appropriate unique well identifier (UWI) from the drop-down list.

It is helpful to have a list of representative UWIs and their licence numbers on hand before logging into the DDS system to prepare a spacing application. Well licence numbers can be obtained from the Well Spacing Map using the "show well information" icon.

Once a UWI has been selected, the form will populate with AER production data. These data can be edited in the Applicant Data section of the Well Productivity Form and should be revised if the auto-populated data are not current or correct. In the case of a commingled well, production data for each applied-for formation are required. Applicants must edit the producing formation and/or producing pool when a commingled pool name is populated. Applications in which this information is not edited will be **closed**.

For commingled wells, the same UWI can be used by selecting the same well licence number multiple times to provide production/volumetric data that can be allocated to each specific producing formation within a well. (See section 7.3.3.1.)

If selecting a confidential well to support an application, all production/volumetric information must be provided. All confidential data provided in support of an application are public and viewable in IAR Query.

For each well used to provide production information, the following data must be provided where applicable:

- well licence number
- unique well identifier
- producing formation
- producing pool
- well status
- on-production date
- last date the well reported production
- the depth to the top of the first perforation
- the depth to the bottom of the last perforation
- the true vertical depth from the kelly bushing (KB) to the top of the first perforation
- the true vertical depth measured to the bottom of the last perforation
- initial operated-day rate based on actual hours of the first month in which oil/gas is produced
- last operated-day rate
- last calendar-day rate based on calendar days in the month in which oil/gas was last being produced
- current ratio of water production to gas production (WGR)
- cumulative gas/oil production
- cumulative water production
- cumulative condensate production

For wells for which volumetric reserves information has been provided, a production plot and decline analysis for each well is required. The analysis must include an explanation of the parameters used to populate the volumetric form (e.g., the net pay used is from the XX/XX-XX-XXX-XXWX well that is in the area of application).

If the number of wells per area calculated on the volumetric form is less than the well density requested, the following warning message appears: "The UWI shows a 'max number of wells per area' less than the requested well density in the application. Confirm your values before saving." This information message asks you to review your data and perhaps change the well density request or provide additional supporting information. A written justification for the submitted production and volumetric data must be included with the application.

Table 7.2 describes the fields on the Production and Volumetric Data Form and the values to be entered.

Table 7.2 Production and volumetric data form fields and values

Field	Description
Licence Number	The well licence number.
UWI	From the drop-down list, the UWI to be used to enter production and/or volumetric reserves information.
AER/APPLICANT DATA	
Producing Formation	The name of the producing formation being applied for.
Pool	The name of the pool being applied for.
Status	The current well status.
On Production Date	The date the well came on production.
Last Month Produced	The last date the well reported production.
Perforated interval(s) (measured in metres KB)	
Perf Top	The depth to the top of the first perforation in the producing formation.
Perf Base	The depth of the bottom of the last perforation in the producing formation.
TVD Top	The true vertical depth from the KB to the top of the first perforation.
TVD Base	The true vertical depth measured to the bottom of the last perforation.
Initial Operated Day Rate	The daily production rate based on actual hours of the first month in which oil/gas is produced.
Current/Last Operated Day Rate	The daily production rate based on actual hours of the current/last month that gas/oil is produced.
Current/Last Calendar Day Rate	The daily production rate based on calendar days of the current/last month that gas/oil is produced.
Current WGR	The current ratio of water production to gas production.
Cumulative Gas/Oil Production	The total volume of gas or oil produced.
Cumulative Water Production	The total volume of water produced.
Cumulative Condensate Production	The total volume of condensate produced.
Volumetric data	
DSU Area	The area used to calculate the volume of oil/gas. This should be the standard DSU size.
Net Pay	The average net pay thickness of the well, DSU, or pool, if available. For horizontal wells, use vertical pay values.
Average Porosity	The average percentage of porosity in the reservoir.
Average Gas/Oil Saturation	The percentage of gas or oil saturation in the reservoir.
Ti	The initial reservoir temperature (K° = C° + 273.15).
Zi	The initial gas compressibility factor.
Pi	The initial reservoir pressure (kPa absolute).
Inverse Formation Volume Factor	Gas: Inverse Gas Formation Volume Factor. $1/[101.325 * Zi * Ti/(288.155 * Pi)] = 1/Bgi$ Oil: The inverse of the initial formation volume factor for the oil in the reservoir (1/Boi).
Coal Bulk Density	The density of the coal in situ (g/cc).
Gas Content	The amount of methane gas contained in the coal (cc/g).

Field	Description
Original Reserves in Place	Original gas/oil reserves in place. OGIP (m^3) = A* h * ø * (Sg) * (1/Bgi) OGIP (m^3) = A* h * Gas Content * Coal Bulk Density OOIP (m^3) = A* h * ø * (So) * (1/Boi)
Pool Recovery Factor	The current estimated percentage of recovery of the pool.
EUR from Decline	Estimated ultimate recoverable reserves based on decline analysis.
Calculated Recovery Factor	Well recovery factor. RF = EUR/OGIP or OOIP
Drainage Area at Pool Recovery Factor	Well drainage area (ha). EUR/ [h * ø * (Sg) * (1/Bgi) * Ri] or EUR/ [h * ø * (So) * (1/Boi) * Ri] or EUR/[h * Gas Content * Coal Bulk Density * Ri]
Max. Number of Wells per Area	DSU area/Drainage area.

Appendix A References

How to Use This Directive	Responsible Energy Development Act Alberta Energy Regulator Rules of Practice
When to Use Schedule 1	ST103: Field and Pool Code List Responsible Energy Development Act
Notification Guidelines	Responsible Energy Development Act Directive 056: Energy Development Application Guide, unit 1, step 4
Unit 1—Equity	
1.1 Rateable Take	Oil and Gas Conservation Act, section 36 Decision 85-5 Directive 032: Common Gas Purchaser and Related Matters, Board Policy and Views Decision 91-8 Directive 040: Pressure and Deliverability Testing Oil and Gas Wells
1.2 Common Purchaser	Oil and Gas Conservation Act, sections 50, 51, 55, and 56 Directive 032: Common Gas Purchaser and Related Matters, Board Policy and Views Decision 91-8
1.3 Common Carrier	Oil and Gas Conservation Act, sections 48, 55, and 56 Directive 032: Common Gas Purchaser and Related Matters, Board Policy and Views Decision 91-8 Decision 2006-021 JP-05: A Recommended Practice for the Negotiation of Processing Fees
1.4 Common Processor	Oil and Gas Conservation Act, sections 53, 55, and 56 Directive 032: Common Gas Purchaser and Related Matters, Board Policy and Views Decision 91-8 Decision 2006-021 JP-05: A Recommended Practice for the Negotiation of Processing Fees
1.5 Compulsory Pooling	Oil and Gas Conservation Rules, section 4.021 Oil and Gas Conservation Act, sections 80, 85, and 86 Examiner Report 91-6 Examiner Report 95-2

Unit 2—Conservation

2.1 Enhanced Recovery Scheme	Oil and Gas Conservation Act, section 39(1)(a) Directive 051: Injection and Disposal Wells IL 94-13: Progress Report Requirements – Conventional Recovery Schemes IL 96-02: Progress Report Requirements for Miscible Flood Schemes GB 2000-8: Process Changes to Disposal Well Applications Bulletin 2004-16: Chances to Enhanced Oil Recovery Application Requirements and Review Process Bulletin 2004-30: Directive 065: Resources Applications for Conventional Oil and Gas Reservoirs Enhanced Recovery Scheme—Application Changes Application Form, Requirements, and Process
2.2 Enhanced Oil Recovery Project	*Rescinded*
2.3 Enhanced Recovery Recognition and Good Production Practice	*Rescinded*
2.4 Concurrent Production	Oil and Gas Conservation Act, section 39(1)(f) Directive 060: Upstream Petroleum Industry Flaring Guide

Unit 3—Production Control

3.1 Commingled Production	Oil and Gas Conservation Rules, sections 3.050 and 3.060 ID 99-01: Gas/Bitumen Production in Oil Sands Areas—Application, Notification, and Drilling Requirements
3.3 Good Production Practice (Primary Pools)	Oil and Gas Conservation Rules, section 10.060 Monthly MRL Order Directive 060: Upstream Petroleum Industry Flaring Guide Directive 007-1: Allowables Handbook ID 99-02: Revised Policy on Administration of Oil MRLs and Overproduction
3.4 GOR Penalty Relief	Oil and Gas Conservation Rules, section 10.060
3.5 Special MRL	Oil and Gas Conservation Rules, section 10.060
3.6 Gas Allowable	Oil and Gas Conservation Rules, sections 4.050, 4,070, 10.095, and 10.300 ID 94-02: Revisions to Oil and Gas Well Spacing Administration ID 94-05: Consolidation of Regulations for Off-Target Penalty Factor Determination IL 85-10: Maximum Daily Rate of Production for Gas Wells

Unit 4—Disposal/Storage	
4.1 Class I-IV Disposal	Oil and Gas Conservation Act, sections 39(1)(c) and 39(1)(d) Directive 051: Injection and Disposal Wells Directive 056: Energy and Development Application Guide Directive 058: Oilfield Waste Management Requirements for the Upstream Petroleum Industry GB 2000-8: Process Changes to Disposal Well Applications
4.2 Acid Gas Disposal	Oil and Gas Conservation Act, section 39(1)(d) Directive 051: Injection and Disposal Wells GB 2000-8: Process Changes to Disposal Well Applications
4.3 Underground Gas Storage	Oil and Gas Conservation Act, section 39(1)(b) Directive 051: Injection and Disposal Wells
Unit 5—Corporate Changes	
5.1 Change of Name of Approval Holder	Oil and Gas Conservation Rules, section 15.005
5.2 Change of Approval Holder	Oil and Gas Conservation Rules, section 15.005
Unit 6—Gas and Ethane Removal	Report 87-A: Gas Supply Protection for Alberta Gas Resources Preservation Act, section 2 ST48: Alberta Gas Removal and Related Applications Bulletin 2006-42: Gas Removal Data System Compliance Process
Unit 7—Special Well Spacing	See Unit 7 for references

To obtain current AER documents, visit the AER website (www.aer.ca) or contact the AER Customer Contact Centre by phone at 403-297-8311 (toll free: 1-855-297-8311) or by fax at 403-297-7040.

Appendix B Sample Template of Company-to-Company Notification

(use for most application types except for well spacing applications)

[Date]

[Offset Company]
[Address]

Attention: [Offset Owner]

Dear [Sir/Madam]:

Application for [type of application]
[List wells or pool]

[Company X] proposes to apply to the Alberta Energy Regulator (AER) for approval to [describe the application]. A copy of the proposed application is enclosed. If you have questions about this application, do not hesitate to contact the undersigned at [telephone number]. If you have any concerns respecting the potential for the application to affect your interest, send a letter to me by fax to [facsimile number], by mail to the letterhead address, or by e-mail to [e-mail address] stating your concerns.

If you do not respond to this letter on or before [date—at least 15 working days from the date of this letter], we will assume that you have no objections to the proposed application and the AER will process the application without further contact with you.

The AER application process is a public process, and all documents filed with the AER will be placed on the public record unless otherwise authorized by the AER in accordance with section 12 of the *Alberta Energy Regulator Rules of Practice* and *Responsible Energy Development Act*.

Yours truly,

[Company]

Appendix C
Application for Gas-Oil Ratio (GOR) Penalty Relief
Form O-33

Alberta Energy Regulator

This form is to be used for smaller, less complex pools only. For detailed application requirements, see *Directive* 065, Unit 3: Production Control. A covering letter should state the reason GOR Penalty Relief is being requested and should be made on behalf of all operators in the pool.

Company Name ____________________ **On behalf of** (N/A ☐) ____________________

Field and Pool Name ____

Gas Conservation

Is solution gas currently being conserved? Yes ☐ No ☐

If gas conservation is planned for the future, identify the tie-in location and provide an implementation schedule.

____

____

____

____

If gas conservation is not considered feasible, include economic analysis showing capital costs, product price forecasts, total revenue (including liquids), payout time, and rate of return.

____

____

____

____

Performance Characteristics

Base MRL ____________________ m^3/d/well Base GOR ____________________ m^3/m^3

Well Location (unique well identifier)	**On Production Date**	**Cumulative Oil Production (m^3)**	**Capability (m^3/d)**	**GOR (m^3/m^3)**

Pool Reserves (company's interpretation)

Area (hectares) ____________________

N (10^3 m^3) ____________________

R_i ____________________

R_i N (10^3 m^3) ____________________

Pressure Data

P_i ____________________ kPa(ga) P_b ____________________ kPa(ga)

Last measured pressure __________ ____________________ kPa(ga)

Date ____________________ Well ____________________

Where appropriate, attach material balance calculations.

O-33-2009-07

Geology

Discuss the potential for further pool development. ______________________________

Recompletion Potential

Comment on recompletion potential or any measures taken to reduce gas production. ______________________________

Enhanced Recovery Potential

Impact on Primary Oil Recovery

Correlative Rights — Include an up-to-date map showing lessee and lessor ownership.
(Note: If pool is multiwell and of mixed ownership, concurrence in writing is required from all operators.)

Appendix D Transfer of Approval

AGREEMENT TO TRANSFER APPROVAL(S)

BETWEEN ____
(company name)

of the City of ______________________________ in the Province of Alberta,

referred to as the **Transferor**, and ________________________ of the City
(company name)

of ____________________ in the Province of Alberta, referred to as the **Transferee**.

The **Transferor**, who is the holder of AER Approval No. ________, dated the ___day of

_________ (or of the attached list of AER Approvals) for a ____________________scheme,
(type of scheme[s])

in the ________________________Field/Area, for good and valuable consideration, transfers
(field/area name)

to the **Transferee** the Approval(s) and all the **Transferor's** right and title in the Approval(s).

The **Transferee** agrees to the transfer of the AER Approval (or attached list of AER Approvals), acknowledges that it is aware of the details and conditions of the approved

____________________scheme(s), and agrees to carry out the scheme(s) as approved.
(type of scheme[s])

Dated at ______________________, on ______________________________.
(city)

Signature: ____________________________
Authorized Representative of Transferor[1]

Signature: ____________________________
Authorized Representative of Transferee

---

[1] If required. See unit 5, "Approval Transfers."

Appendix E AER Staff Contacts

Rescinded

Appendix F Enhanced Recovery (ER) Scheme Application Form

Alberta Energy Regulator

Resources

Enhanced Recovery (ER) Scheme

DAY	MONTH	YEAR

APPLICANT'S REFERENCE

____

The applicant certifies that the information provided here and in all supporting documentation is correct and in accordance with all regulatory requirements or as directed by the Alberta Energy Regulator.

1 APPLICATION TYPE

1. Type of ER scheme being proposed or amended:

☐ Waterflood
☐ Immiscible gas/Solvent flood
☐ Miscible flood
☐ Gas cycling
☐ Other

2. Is this application for a new ER scheme or an amendment to an existing ER scheme approval? New ☐ Amendment ☐

If you select "New,"

- *proceed to Section 2; do not answer questions 3 and 4;*
- *attachments required: Isopach Map, Well Log(s), Pressure Data, and Interpretation.*

3. What is the existing AER approval number proposed for amendment? ☐

4. Type of amendment:

☐ Add injection well location(s)
☐ Amend approval area
☐ Amend approval conditions
☐ Scheme termination

If you select "Add injection well location(s)" only,

- *you must respond to questions in Sections 2, 3, and 5. Do not respond to questions in Section 4.*

If you select "Amend approval area" only,

- *you must respond to questions in Sections 2, 4, and 5. Do not respond to questions in Section 3.*

If you select "Add injection well location(s)" and "Amend approval area,"

- *you must respond to questions in Section 2, 3, 4, and 5.*

If you select "Amend approval conditions" only,

- *you must respond to questions in Section 2 and 5. Do not respond to questions in Sections 3 and 4.*

If you select "Scheme termination" only,

- *you must respond to questions in Section 2 and 5. Do not respond to questions in Sections 3 and 4 or question 18 in Section 5.*

2 OWNERSHIP AND NOTIFICATION INFORMATION

5. The primary applicant must
   a) be the proposed approval holder for a new scheme or the current approval holder for an existing scheme, and
   b) represent all well licensees in the proposed approval area.

   Have these requirements been met? Yes ☐ No ☐

   If your answer is "No," you cannot submit this application.

6. An ER scheme application cannot be submitted until notification of all well licensees has been completed in accordance with *Directive 65*.

   Has notification been completed in accordance with *Directive 65*? Yes ☐ No ☐

   If your answer is "No," you cannot submit this application.

7. Are there outstanding concerns from well licensees? Yes ☐ No ☐

   If yes, the Licensee Concerns attachment must be submitted as part of the application, in accordance with *Directive 65*.

3 PROPOSED INJECTION WELL LOCATIONS AND INJECTION INTERVALS

8. An ER scheme application cannot be submitted unless the proposed injection wells have been drilled.

   Have the proposed injection wells been drilled? Yes ☐ No ☐

   If your answer is "No," you cannot submit this application.

9. An ER scheme application cannot be submitted unless the source of the proposed injection fluid has been secured.

   Has the source of the proposed injection fluid been secured? Yes ☐ No ☐

   If your answer is "No," you cannot submit this application.

10. Provide the following for the proposed injection well locations:

Well Licence Number	Unique Well Identifier (UWI)							Injection Interval (TVD mKB)		Porosity Interval (TVD mKB)		Fluid Interface (TVD mKB) if applicable	
	LE	LSD	SEC	TWP	RG	MER	ES	Top	Base	Top	Base	Gas/Oil	Oil/Water

11. What type of injection fluid, as identified by *Directive 051*, will be used?

☐ Class II – produced water (brine) without H_2S

☐ Class II – produced water (brine) with H_2S

☐ Class III – hydrocarbons or other gases without H_2S

☐ Class III – hydrocarbons or other gases with H_2S

☐ Class IV – non-saline water

If you select "Class II – produced water (brine) without H_2S" only,
- *do not respond to question 11a. Proceed to question 12.*

If you select "Class III – hydrocarbons or other gases without H_2S" only,
- *do not respond to question 11a, and*
- *proceed to question 12.*

If you select "Class IV – non-saline water,"
- *do not respond to question 11a, and*
- *proceed to question 12.*

11a. If an injection fluid contains H_2S and an emergency response plan (ERP) is required, the AER must ensure that an up-to-date ERP is in place prior to its decision on the application.

Is an AER-approved ERP incorporating the proposed scheme in place? Yes ☐ No ☐

If no, a discussion addressing the status of the ERP must be included in the Application attachment, in accordance with *Directive 65*.

12. Will injection commence in all proposed injection wells within three months of receipt of approval? Yes ☐ No ☐

If no, a discussion addressing the anticipated commencement of injection and the reason for the delay must be included in the Application attachment, in accordance with *Directive 65*.

4 PROPOSED APPROVAL AREA

13. Is the entire proposed approval area within the AER's Pool Order boundary for the subject pool? Yes ☐ No ☐

If you select "No," you must respond to question 15.

14. Does your interpretation of pool extent correspond to the AER's Pool Order boundary for the subject pool? Yes ☐ No ☐

If you select "No," you must respond to question 15.

15. Is the difference in pool delineation interpretation pertinent to the proposed ER scheme, in accordance with *Directive 65*? Yes ☐ No ☐

Provide a discussion of the difference in pool delineation and the pertinence to the proposed ER scheme in the Application attachment, in accordance with *Directive 65*.

5 SCHEME DETAILS

16. Is the scheme area currently administered under good production practice (GPP)? Yes ☐ No ☐

17. Will produced gas from the ER scheme area be conserved, in accordance with *Directive 060* requirements? Yes ☐ No ☐

18. What is the proposed voidage replacement ratio (VRR), on a monthly basis, for the scheme?

The AER normally specifies a VRR of 1.0 to fully maintain reservoir pressure. If the VRR will not be 1.0, provide a technical justification in the Application attachment, in accordance with *Directive 65*.

19. Is or will any gas-cap gas be produced from the subject pool during the operation of the ER scheme? Yes ☐ No ☐

If yes, include a discussion on the potential for fluid migration into the gas cap in the Application attachment, in accordance with *Directive 65*.

If you select "No," do not respond to questions 20, 20a, 20b, or 20c.

20. Is gas-cap gas currently being produced from the scheme area? Yes ☐ No ☐

If you select "No," do not respond to questions 20a, 20b, or 20c.

20a. Has the appropriate concurrent production (CCP) approval been issued? Yes ☐ No ☐

If you select "Yes," do not respond to questions 20b or 20c.

20b. An application for CCP is required. Has an application for CCP been registered? Yes ☐ No ☐

If you select "No," do not respond to question 20c.

20c. If yes, provide the CCP application number.

Appendix G Gas and Ethane Removal Forms

Long-Term Gas Removal Application

Short-Term Ethane Removal Application

Long-Term Gas Removal Application

Alberta Energy Regulator

For permit to remove gas from Alberta in volumes greater than 3 billion cubic metres (m^3) or for terms greater than 2 years.

This application is made under section 2 of the *Gas Resources Preservation Act*. Use this form for new permits and amendments of existing permits.

Remember to answer all questions and to add attachments if the space provided is inadequate. The AER reserves the right to require an applicant to furnish additional information as it deems necessary to complete or supplement the application.

1. Request is for ☐ New Permit

☐ Amendment to Permit No. ______________________

2. ☐ Change of permit holder (amendment of permit)

Existing permit holder ______________________

Proposed permit holder ______________________

☐ The proposed permit holder agrees to assume and perform all of the obligations and duties of the existing permit holder under the permit.

3. Permit(s) No. to be rescinded (if applicable) ______________________

4. a) Total volume of gas proposed for removal:

Existing volume authorized (if applicable) (m^3) ______________________

Proposed volume authorized (m^3) ______________________

b) Gas required for fuel to transport gas from Alberta: Does the proposed total authorized volume of gas include all fuel needed to transport the gas from the Alberta border to the intended market(s)?

☐ Yes ☐ No

If No, how would such fuel gas be accounted for? (Any gas, including fuel gas, removed from Alberta must be authorized by and reported under a gas removal permit.)

____

____

____

____

____

____

____

____

____

____

2012-03

5. Term of permit

Existing term and commencement date (if applicable) ____________________

____

Proposed term and commencement date ____________________

____

If the proposed term is greater than 15 years, attach a discussion describing how the circumstances relating to the sales contract involved could be considered as special ones that would justify the requested term, including an indication as to whether the proposed gas removals could proceed under a 15-year permit and, if not, why not.

6. Name of proposed market(s), and the location and type of end-use customer(s) to be served under the permit

____

____

____

____

____

____

____

____

____

7. Are arrangements in place for transporting the applied-for gas from the Alberta receipt point(s) to the intended end-use customer(s)?

☐ Yes ☐ No

If No, describe the transportation arrangements involved, including comments on when you anticipate that any new facilities to be built would be completed.

____

____

____

____

____

____

____

____

____

____

8. Provide a summary of the pricing arrangements and how they were determined for the applied-for gas. Comment on any provisions to ensure that prices continue to reflect market conditions throughout the term of the permit.

9. Discuss how the applied-for removal of gas would be in the Alberta public interest.

10. Attach a table in the required format (described in *Directive 065: Resources Applications for Conventional Oil and Gas Reservoirs*) of the lands/zones that would supply the permit or amended permit, including
    - the legal description of all the lands involved,
    - the zone or zones under the applicant's control for the lands in question, and
    - the working interest ownership under the applicant's control for the lands/zones.

11. Attach a summary of the total gas reserves volume associated with the lands serving the proposed permit, together with a list of all commitments that would be served by the reserves portfolio involved, including the proposed permit and other permits (specify the number of each existing permit, as well as remaining authorized commitment), intra-Alberta commitments (such as industrial, commercial, or residential contracts or corporate warranties to other companies), and any other commitments.

    Total gas reserves volume associated with the lands serving the proposed permit: ______________________ m^3

    Commitments to be served by the reserves portfolio involved:

Permit No. or other commitment (describe)	Total volume of commitment (m^3)

Reporting Requirements Associated with a Gas Removal Permit

A monthly gas removal permit statement must be completed for each permit and filed electronically with the AER by midnight on the 28th day of the month following the data month. The data month is the month when the gas is delivered. If the 28th is not a business day, the deadline falls on the next business day. The form must be completed and filed for each permit even if no gas has been removed. Questions on reporting may be directed to the AER at GRDAdmin@aer.ca.

Short-Term Ethane Removal Application

Alberta Energy Regulator

For permit to remove ethane from Alberta in volumes less than 3 billion cubic metres (m^3) and for a term of not more than 2 years.

This application is made under section 2 of the *Gas Resources Preservation Act*. Use this form for new permits and amendments of existing permits.

Remember to answer all questions and to add attachments if the space provided is inadequate. The AER reserves the right to require an applicant to furnish additional information as it deems necessary to complete or supplement the application.

1. Request is for ☐ New Permit

☐ Amendment to Permit No. ______________________________

2. ☐ Change of permit holder (amendment of permit):

Existing permit holder ______________________________

Proposed permit holder ______________________________

☐ The proposed permit holder agrees to assume and perform all of the obligations and duties of the existing permit holder under the permit.

3. Permit(s) No. to be rescinded (if applicable) ______________________________

4. Total volume of ethane proposed for removal:

Existing volume authorized (if applicable) (m^3) ______________________________

Proposed volume authorized (m^3) ______________________________

5. Term of permit

Existing term and commencement date (if applicable) ______________________________

____

Proposed term and commencement date ______________________________

____

6. Name of proposed market(s) and location and type of end-use customer(s) to be served under the permit.

____

____

____

7. Are arrangements in place for transporting the applied-for ethane from the Alberta receipt point(s) to the intended end-use customer(s)?

☐ Yes ☐ No

If No, describe the transportation arrangements involved, including comments on when it is anticipated that any new facilities to be built would be completed.

8. List the name and location (Legal Subdivision-Section-Township-Range, Meridian) of the facilities from which the ethane will be obtained.

Reporting Requirements Associated with an Ethane Removal Permit

A monthly ethane removal permit statement must be completed for each permit and filed electronically with the AER by midnight on the 28th day of the month following the data month. The data month is the month when the ethane is delivered. If the 28th is not a business day, the deadline falls on the next business day. The form must be completed and filed for each permit even if no ethane has been removed. Questions on reporting may be directed to the AER at GRDAdmin@aer.ca.

Appendix H Gas Reserves Data Sheet

Gas Reserves Data Sheet

Alberta Energy Regulator

GAS VOLUMES AT 101.325 kPa AND 15°C

DATE YR/MO/DAY

SUBMITTED BY

FIELD

POOL

ZONE

TYPE WELL (LOCATION) W

TOP OF PAY K.B. S.L.

BASE OF GAS PAY K.B. S.L.

POOL MEAN FORMATION DEPTH K.B. S.L.

TYPE OF RESERVE
- ☐ ASSOCIATED
- ☐ NONASSOCIATED
- ☐ SOLUTION

AVERAGE POROSITY SOURCE

CUTOFFS POROSITY SOURCE

PERMEABILITY mD

GAS SATURATION (Sg) = 1 - (S_W + S_O)

S_W SOURCE

S_O SOURCE

INITIAL RESERVOIR PRESSURE, P_i SOURCE

RESERVOIR TEMPERATURE SOURCE

Z P_r SOURCE

T_r

GAS ANALYSIS P_c, kPa Tc, K

P_c', kPa Tc', K

RELATIVE DENSITY SOURCE

$$\text{RESERVOIR CONSTANT } (m^3/m^3) = \varnothing \times Sg \times \frac{Pi}{101.325} \times \frac{288.15}{T} \times \frac{1}{Z}$$

RECOVERY FACTOR SOURCE

SURFACE LOSS FACTOR SOURCE

RAW GAS COMPOSITION IN MOLE FRACTIONS

N_2	CO_2	H_2S	H_2	H_e	C_1	C_2	C_3	iC_4	nC_4

C_5	C_6	C_7+

SOURCE

GROSS HEATING VALUE OF MARKETABLE GAS, MJ/m^3

SOURCE

RESERVE ESTIMATE - INITIAL CONDITIONS

	PROVEN	PROBABLE
G/W, metres SL		
G/O, metres SL		
AREA, hectares		
h, metres		
ROCK VOLUME, $10^4 m^3$		
Ø, fraction		
GAS SAT, fraction		
P_i, k Pa		
T, K		
Z		
RESERVOIR CONSTANT, m^3/m^3		
IGIP, $10^6 m^3$		
RECOVERY FACTOR, fraction		
PRODUCIBLE, $10^6 m^3$		
SURFACE LOSS FACTOR, fraction		
MARKETABLE, $10^6 m^3$		
INITIAL ESTABLISHED MARKETABLE, $10^6 m^3$		
MARKETABLE GAS PRODUCED, $10^6 m^3$		
REMAINING ESTABLISHED MARKETABLE, $10^6 m^3$		
REMAINING ESTABLISHED MARKETABLE UNDER CONTRACT, $10^6 m^3$		
EFFECTIVE DATE, YR/MO/DAY		

– O

STOIP, $10^3 m^3$	
GOR, m^3/m^3	
GIP, $10^6 m^3$	
RECOVERY FACTOR, fraction	
PRODUCIBLE, $10^6 m^3$	
SURFACE LOSS FACTOR, fraction	
MARKETABLE, $10^6 m^3$	
MARKETABLE GAS PRODUCED, $10^6 m^3$	
REMAINING ESTABLISHED MARKETABLE, $10^6 m^3$	
EFFECTIVE DATE YR/MO/DAY	

$$\text{STOIP, } 10^3 m^3 = 10 A h \varnothing (1 - Sw) \frac{1}{B_{oi}}$$

GOR SOURCE

$1/B_{oi}$ SOURCE

STOIP = STOCK TANK OIL IN PLACE

GOR = INITIAL DISSOLVED GAS-OIL RATIO

ADDITIONAL COMMENTS

Appendix I EAS Well Spacing Application Forms and Explanatory Notes

New Spacing Application—Holdings or Units

New Spacing Application—Special Drilling Spacing Units

Rescind Spacing Application—Holdings or Units

Rescind Spacing Application—Special Drilling Spacing Units

Modify Spacing Application—Holdings or Units

New Spacing Application—Holdings or Units

Alberta Energy Regulator

Directive 065

New Spacing Application

DAY MONTH YEAR ____________ APPLICATION # ________ APPLICANT'S FILE NUMBER ____________

The applicant certifies that the information provided here and in all supporting documentation is correct and in accordance with all regulatory requirements or as directed by the Alberta Energy Regulator.

SUBMISSION STATUS SUBMISSION ID CREATION DATE

1. NOTIFICATION REQUIREMENTS

1.	Were Directive 065 notification templates used?	☐ Yes ☐ No
2.	Have all parties been notified in accordance with Directive 065?	☐ Yes ☐ No
3.	What was the mailing date of the last notification letter sent?	____________
4.	Are there any outstanding objections or concerns?	☐ Yes ☐ No
5.	Is the application consistent with the details in the notification?	☐ Yes ☐ No

2. APPLICATION TYPE

SPACING APPLICATION TYPE ____________ DESCRIPTION ____________

APPLICATION SUBTYPE ____________

3. APPLICATION AREA

		LSD	Section	Township	Range	Meridian
Holding	1					
		____	____	____	____	____

FORMATIONS

4. APPLICATION DETAILS

1. What is the source of production? ________

Spacing Application Report 3

SUBMISSION STATUS ____________ SUBMISSION ID ________ CREATION DATE ________

5. HOLDINGS OR UNITS

1. Does your area of application include entire DSUs? ☐ Yes ☐ No

2. Does each applied-for holding have common ownership at the lessor and lessee levels? ☐ Yes ☐ No

3. Is each applied-for holding/unit adjacent to a previously approved area for the same formation (s)/pool(s)? ☐ Yes ☐ No

4. Does every DSU in each applied for holding/unit have an adjacent DSU with production data? ☐ Yes ☐ No

5. Is any part of each applied-for holding/unit within 3 standard DSUs of a previously approved area for the same formation(s)/pool(s)? ☐ Yes ☐ No

6. Is the proposed well density less than or equal to the well density in the previously approved area? ☐ Yes ☐ No

7. Does each proposed holding/unit contain production data in the applied-for formation(s)/pool(s)? ☐ Yes ☐ No

8. Is the density of the oil 920 kg/m3 or greater at 15°C ? ☐ Yes ☐ No

9. Enter the proposed Well Density. (well densities are per pool). ____________

10. The standard buffer zone distance and orientation for this area of the province is: ____________

10a. Do you want to proceed with the standard buffer zone distance and orientation? ☐ Yes ☐ No

10b. If NO, enter the buffer zone distance. ____________

10c. Enter the buffer orientation. ____________

11a. Are you requesting an interwell distance? ☐ Yes ☐ No

If YES, enter the interwell distance. ____________

6. SPECIAL DRILLING SPACING UNITS

– This section is not required –

Completing the New Spacing Application—Holdings or Units

For information on filling in sections 1–5, refer to unit 7, section 7.6.2, "Spacing Form."

Section 5: Holdings or Units

1) Does your area of application include entire DSUs?

Select YES if each area of application contains whole DSUs.

If you select NO, the application cannot be filed as the area of application must contain whole DSUs.

2) Does each applied-for holding have common ownership at the lessor and lessee levels?

Select YES if each applied-for holding has common mineral rights ownership at both the lessor and lessee levels as defined in section 1.020(2)(4) of the *OGCR* or ownership is considered common under *Directive 065*, section 7.2.4.

If you select NO, the application cannot be filed as common mineral rights ownership is a prerequisite to establish a holding (see section 7.2.4).

This question is not applicable if the application subtype is "Unit."

3) Is each applied-for holding/unit adjacent to a previously approved area for the same formation(s)/pool(s)?

Select YES if each applied-for holding or unit in the application area is adjacent to a previously approved area for the same formation(s) or pool(s). Diagonal DSUs are considered to be adjacent.

Select NO if each applied-for holding or unit area is not adjacent to a previously approved area for the same formation(s)/pool(s).

4) Does every DSU in each applied-for holding/unit have an adjacent DSU with production data?

Select YES if every DSU in each applied-for holding or unit has an adjacent DSU with well production data for all applied-for formation(s) or pool(s) within the previously approved area. (See Figure 7.5, "Quick Application Path.")

Select NO if every DSU in each applied-for holding or unit does not have an adjacent DSU with well production data for all applied-for formation(s)/pool(s) within a previously approved area.

5) *Is any part of each applied-for holding/unit within 3 standard DSUs of a previously approved area for the same formation(s)/pool(s)?*

Three standard DSUs is the distance from any boundary of the applied-for holding/unit to any boundary of a previously approved area. This includes diagonal DSUs. (See figure 7.6, "Standard Application Path.")

Select YES if any part of each applied-for holding/unit is within 3 standard DSUs of any boundary of a previously approved holding/unit or reduced DSU for the same formation(s) or pool(s).

Select NO if any holding within the area of application does not have a boundary that is within 3 standard DSUs of an approval for the same formation(s)/pool(s).

6) *Is the proposed well density less than or equal to the well density in the previously approved area?*

Select YES if the proposed well density is less than or equal to the well density in the previously approved area.

Select NO if the proposed well density is greater than the well density in the previously approved area.

7) *Does each proposed holding/unit contain production data in the applied-for formation(s)/pool(s)?*

Select YES if each holding or unit has at least one well with enough production history to allow for the submission of volumetric reserves data that can clearly support the need for the requested special well spacing in the applied-for formation(s) or pool(s). Additional production and volumetric reserves information from producing wells in surrounding areas should also be included to fully support an application. Large areas of application containing production and volumetric data from only a limited number of wells maybe considered premature and could be closed.

In areas where limited production data is available the applicant must provide geological evidence to demonstrate the resource being present throughout the entire area of application and the quality of the reservoir (i.e. geological cross sections, geological analysis and structural and net pay isopach mapping).

Select NO if any proposed holding does not contain production data in the applied-for formation(s)/pool(s).

8) *Is the density of the oil 920 kg/m^3 or greater at 15°C?*

Heavy oil, as defined in *Directive 017: Measurement Requirements for Upstream Oil and Gas Operations*, is "crude oil production with a density of 920 kg/m^3 or greater at 15°C." This crude oil density incorporates most of the areas of east-central Alberta, where heavy oil production operations normally occur. Heavy oil development typically requires higher well densities to maximize recovery.

Select YES if the application is for heavy oil. You must attach a Fluid Analysis that contains an analysis of the native reservoir fluid, which includes the density of the oil. If the proposed well density is >2 wells per pool per quarter but does not exceed 4 wells per pool per quarter section, the application will be registered in the nonstandard processing path. However, upon registration, it will be reviewed for the appropriate processing pathway and may qualify as a standard path application.

Select NO if the application is not for heavy oil.

9) Enter the proposed well density.

All holding/unit applications must propose a well density. Well density is defined as the number of wells per pool per area. Enter the well density and then select the well density area. Possible well density areas are

- 1 Legal Subdivision
- 2 Legal Subdivisions
- 1 Quarter Section
- 1 Half Section
- 1 Section
- Limited by Buffer Distance
- Limited by Interwell and Buffer Distances

Note that typically well density areas are equivalent to the size of the standard DSU (e.g., if the standard DSU is 1 section, the well density area would typically be per pool per 1 section).

10) The standard buffer zone distance and orientation for this area of the province is:

This is populated based on the spacing application type (Spacing: Gas or Spacing: Oil) selected on Schedule 1 and the area of application selected on the Well Spacing Map.

The standard buffer zones within the province are as indicated in the table below.

Schedule	Holding or unit	Standard buffer zone
13A	Gas	150 m on south and west boundaries of a holding or unit
All Alberta except 13A	Gas	150 m on all boundaries of a holding or unit
All Alberta	Oil	100 m on all boundaries of a holding or unit

10a) Do you want to proceed with the standard buffer zone distance and orientation?

Select YES if you are proposing the standard buffer zone as shown in the table in question 10.

Select NO to request a nonstandard buffer zone. You must enter the buffer zone distance and orientation in questions 10b and 10c and provide additional technical information supporting the request.

10b) If NO, enter the buffer zone distance.

Enter the buffer zone distance from the boundaries of each holding/unit in metres.

10c) Enter the buffer orientation.

Select the boundaries of the holding/unit that the buffer zone distance applies to.

11) Are you requesting an interwell distance?

If you select YES, enter the requested interwell distance in question 11a.

Note that an interwell distance is not required for a holding/unit spacing application.

11a) If YES, enter the interwell distance.

New Spacing Application—Special Drilling Spacing Units

Alberta Energy Regulator

Directive 065

New Spacing Application

DAY MONTH YEAR ________ APPLICATION # ________ APPLICANT'S FILE NUMBER ________

The applicant certifies that the information provided here and in all supporting documentation is correct and in accordance with all regulatory requirements or as directed by the Alberta Energy Regulator.

SUBMISSION STATUS SUBMISSION ID CREATION DATE

1. NOTIFICATION REQUIREMENTS

1. Were Directive 065 notification templates used? ☐ Yes ☐ No
2. Have all parties been notified in accordance with Directive 065? ☐ Yes ☐ No
3. What was the mailing date of the last notification letter sent? ________
4. Are there any outstanding objections or concerns? ☐ Yes ☐ No
5. Is the application consistent with the details in the notification? ☐ Yes ☐ No

2. APPLICATION TYPE

SPACING APPLICATION TYPE ________ DESCRIPTION ________

APPLICATION SUBTYPE ________

3. APPLICATION AREA

	LSD	Section	Township	Range	Meridian
Special DSU	____	____	____	____	____

FORMATIONS

4. APPLICATION DETAILS

1. What is the source of production? ________

5. HOLDINGS OR UNITS

Section 5 is not required for Special Drilling Spacing Unit (DSU) applications.

Spacing Application Report 3

SUBMISSION STATUS ____________ **SUBMISSION ID** ________ **CREATION DATE** ________

6. SPECIAL DRILLING SPACING UNITS

1. Are you increasing the well density in the special DSU? ☐ Yes ☐ No

2. The DSU size is: ____________

3. The standard target area locations for the special DSU are based on Section 4.030(1) of the OGCR. ____________

Completing the New Spacing Application—Special Drilling Spacing Units

For information on filling in sections 1–5, refer to unit 7, section 7.6.2, "Spacing Form."

Section 6: Special Drilling Spacing Units

1) *Are you increasing the well density in the special DSU?*

Select YES if you are applying to increase the well density in a special DSU. Applications to increase the well density in a special DSU will require supporting well information from wells either inside or adjacent to the area of application. This information must be provided using the EAS production and volumetric forms.

Select NO if you are not applying to increase the well density in a special DSU.

2) *The DSU size is:*

All special DSU applications will have a DSU size described as "Special DSU." The value Special DSU will be auto-populated and cannot be changed by the applicant.

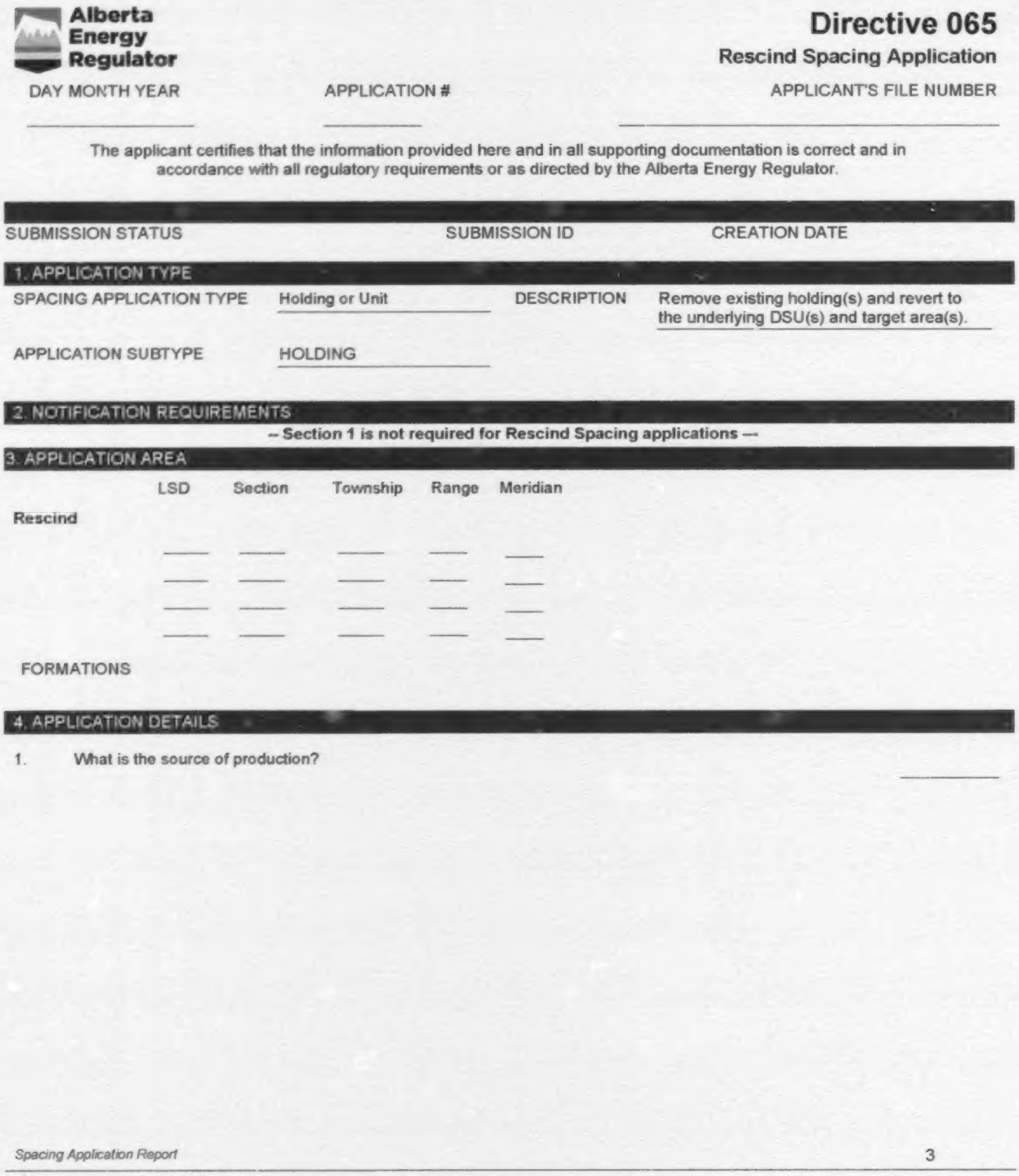
3) *The standard target area locations for the special DSU are based on section 4.030(1) of the* OGCR.

The standard target areas for oil and gas are given in the following table.

Area of the province	Substance	Target area description
Inside Schedule 13A	Gas	At least 150 m from the south and west boundaries of the drilling spacing unit; section 4.030(2) of the *OGCR*.
Outside Schedule 13A	Gas	The central area within the drilling spacing unit having sides of 150 m from the sides of the drilling spacing unit and parallel to them; section 4.030(1)(a) of the *OGCR*.
All Alberta	Oil	The central area within the drilling spacing unit having sides 100 m from the sides of the drilling spacing unit and parallel to them; section 4.030(1)(b) of the *OGCR*.

The standard target areas are auto-populated on the EAS form and cannot be changed by the applicant.

Rescind Spacing Application—Holdings or Units



Alberta Energy Regulator

Directive 065

Rescind Spacing Application

DAY MONTH YEAR ____ APPLICATION # ____ APPLICANT'S FILE NUMBER ____

The applicant certifies that the information provided here and in all supporting documentation is correct and in accordance with all regulatory requirements or as directed by the Alberta Energy Regulator.

SUBMISSION STATUS SUBMISSION ID CREATION DATE

1. APPLICATION TYPE

SPACING APPLICATION TYPE: Holding or Unit

DESCRIPTION: Remove existing holding(s) and revert to the underlying DSU(s) and target area(s).

APPLICATION SUBTYPE: HOLDING

2. NOTIFICATION REQUIREMENTS

— Section 1 is not required for Rescind Spacing applications —

3. APPLICATION AREA

	LSD	Section	Township	Range	Meridian
Rescind					

FORMATIONS

4. APPLICATION DETAILS

1. What is the source of production? ____

Spacing Application Report 3

SUBMISSION STATUS ______________ SUBMISSION ID ________ CREATION DATE ________

5. HOLDINGS OR UNITS

1. Does your area of application include entire DSUs? ☐ Yes ☐ No

2. Enter the well density to be rescinded (well densities are per pool). ____________

3. Enter the buffer zone distance to be rescinded. ____________

3a. Enter the buffer orientation to be rescinded. ____________

4. Is there an interwell distance to be rescinded? ☐ Yes ☐ No

4a. If yes, enter the interwell distance to be rescinded. ____________

6. SPECIAL DRILLING SPACING UNITS

-- This section is not required --

Completing the Rescind Spacing Application—Holding or Units

For information on filling in sections 1–4, refer to unit 7, section 7.6.2, "Spacing Form."

Section 5: Holding or Units

1) Does your area of application include entire DSUs?

Select YES if each area of application contains whole DSUs. Note that you can only use the Rescind application form to remove a DSU(s) from a holding where a lease(s) has expired and reverted back to the Crown, or if you wish to rescind all or a portion of the holding in favour of the standard spacing specified in Part 4 of the *OGCR*.

If you select NO, the application cannot be filed.

2) Enter the well density to be rescinded.

The well density entered on the form must match the well density in the existing approval being rescinded. Well density is defined as the number of wells per pool per area.

Enter the well density and then select the well density area. Possible well density areas are

- 1 Quarter Legal Subdivision
- 1 Legal Subdivision
- 2 Legal Subdivisions
- 1 Quarter Section
- 1 Half Section
- 1 Section
- 2 Section
- 3 Section
- 4 Section
- Per Holding
- Limited by Buffer Distance
- Limited by Buffer and Interwell Distances
- Limited by Interwell Distance
- Per Pool
- See Special Provision

3) Enter the buffer zone distance to be rescinded.

Enter the buffer zone distance from the boundaries of each holding/unit in metres of the existing approval being rescinded. The buffer zone distance entered must match the existing approval.

3a) Enter the buffer orientation to be rescinded.

Select the boundaries of the holding/unit that the buffer zone distance applies to. The selected boundaries must match the existing approval.

4) Is there an interwell distance to be rescinded?

If you select YES, enter the approved interwell distance in question 4a.

If No, question 4a is not required.

4a) If YES, enter the interwell distance to be rescinded.

The interwell distance entered must match the existing approval.

Rescind Spacing Application—Special Drilling Spacing Units

Alberta Energy Regulator

Directive 065
Rescind Spacing Application

DAY MONTH YEAR ______ APPLICATION # ______ APPLICANT'S FILE NUMBER ______

The applicant certifies that the information provided here and in all supporting documentation is correct and in accordance with all regulatory requirements or as directed by the Alberta Energy Regulator.

SUBMISSION STATUS SUBMISSION ID CREATION DATE

1. APPLICATION TYPE

SPACING APPLICATION TYPE Special DSU

DESCRIPTION Remove existing special DSU(S) and revert to the standard DSU(s) and target area(s).

APPLICATION SUBTYPE SPECIAL_DSU

2. NOTIFICATION REQUIREMENTS

1.	Were Directive 065 notification templates used?	☐ Yes ☐ No
2.	Have all parties been notified in accordance with Directive 065?	☐ Yes ☐ No
3.	What was the mailing date of the last notification letter sent?	
4.	Are there any outstanding objections or concerns?	☐ Yes ☐ No
5.	Is the application consistent with the details in the notification?	☐ Yes ☐ No

3. APPLICATION AREA

	LSD	Section	Township	Range	Meridian
Rescind					

FORMATIONS

4. APPLICATION DETAILS

1. What is the source of production?

5. HOLDINGS OR UNITS

Section 5 is not required for Special Drilling Spacing Unit (DSU) applications.

Spacing Application Report 3

SUBMISSION STATUS ____________ SUBMISSION ID ________ CREATION DATE ________

6. SPECIAL DRILLING SPACING UNITS

1. Does your area of application create standard DSUs? ☐ Yes ☐ No

2. Enter the DSU size being rescinded. ____________

3. Enter the DSU orientation being rescinded. ____________

4. Enter the target area description to be rescinded. ____________

Completing the Rescind Spacing Application—Special Drilling Spacing Units

For information on filling in sections 1–4, refer to unit 7, section 7.6.2, "Spacing Form."

Section 6: Special Drilling Spacing Units

1) Does your area of application create standard DSUs?

Select YES if each area of application creates standard DSUs. Note that you can only use the Rescind Application form to rescind special DSUs that contain entire standard DSUs (i.e., if the special DSU size is 2 legal subdivisions, you would have to apply to rescind two special DSUs to form a standard quarter section oil DSU to have a valid application).

If you select NO, the application cannot be filed.

2) Enter the DSU size being rescinded.

The DSU size entered on the form must match the DSU size in the existing approval being rescinded.

Possible DSU sizes are

- 1 Legal Subdivision
- 2 Legal Subdivisions
- 1 Quarter Section
- 1 Half Section
- 1 Section
- 2 Section
- 3 Section
- 4 Section
- Per Pool
- See Special Provision

3) Enter the DSU orientation being rescinded.

If a DSU size of 2 Legal Subdivisions or 1 Half Section is selected in question 2, then you must select a DSU orientation.

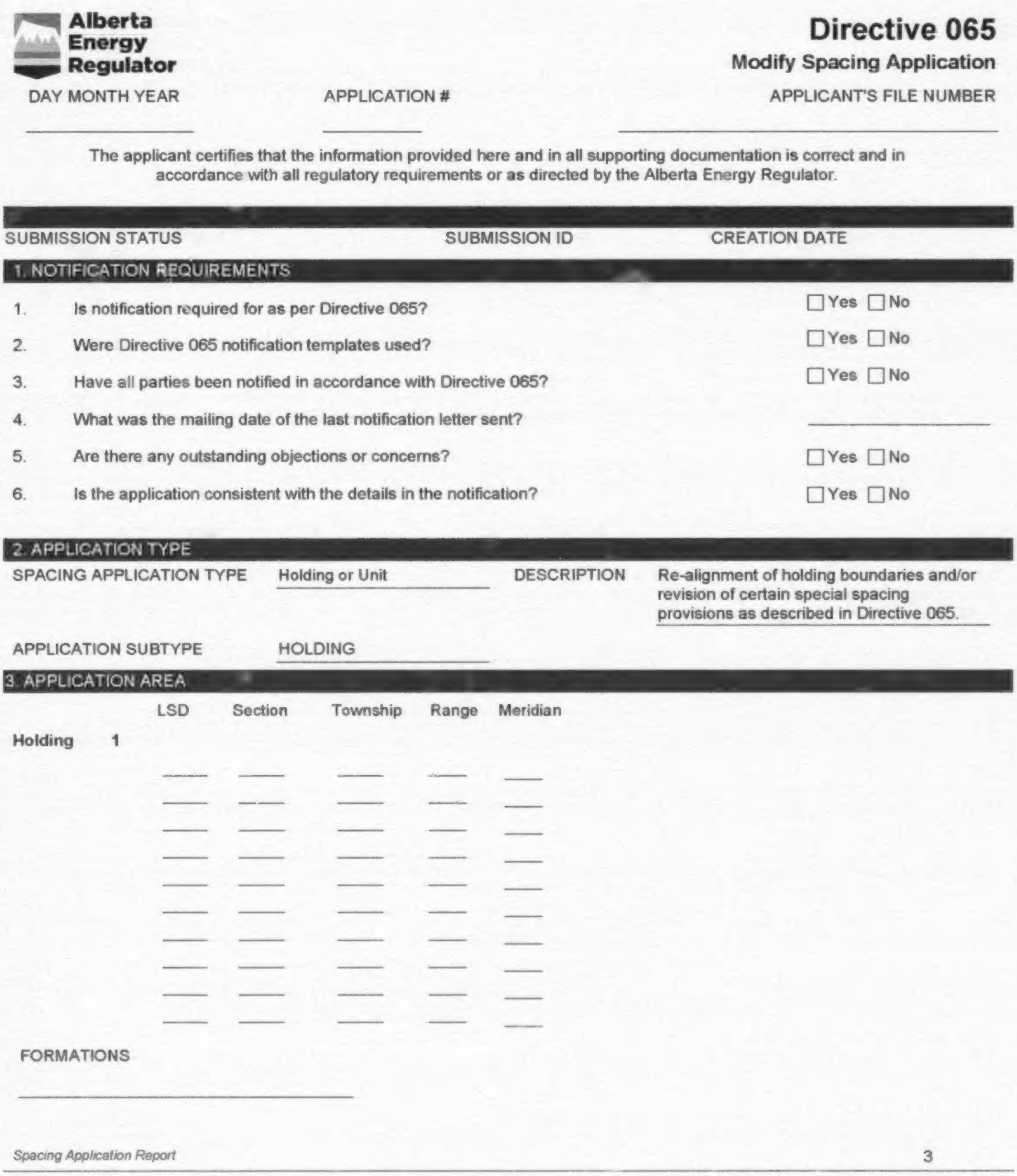
Possible DSU orientations are

- North South
- East West

4) Enter the target area description to be rescinded.

Enter the target area description to be rescinded. The target area description entered must match the existing approval.

Modifying Spacing Application—Holdings or Units



Alberta Energy Regulator

Directive 065

Modify Spacing Application

DAY MONTH YEAR ______ APPLICATION # ______ APPLICANT'S FILE NUMBER ______

The applicant certifies that the information provided here and in all supporting documentation is correct and in accordance with all regulatory requirements or as directed by the Alberta Energy Regulator.

SUBMISSION STATUS | SUBMISSION ID | CREATION DATE

1. NOTIFICATION REQUIREMENTS

1. Is notification required for as per Directive 065? ☐ Yes ☐ No
2. Were Directive 065 notification templates used? ☐ Yes ☐ No
3. Have all parties been notified in accordance with Directive 065? ☐ Yes ☐ No
4. What was the mailing date of the last notification letter sent? ______
5. Are there any outstanding objections or concerns? ☐ Yes ☐ No
6. Is the application consistent with the details in the notification? ☐ Yes ☐ No

2. APPLICATION TYPE

SPACING APPLICATION TYPE: Holding or Unit

DESCRIPTION: Re-alignment of holding boundaries and/or revision of certain special spacing provisions as described in Directive 065.

APPLICATION SUBTYPE: HOLDING

3. APPLICATION AREA

	LSD	Section	Township	Range	Meridian
Holding 1					
	____	____	____	____	____
	____	____	____	____	____
	____	____	____	____	____
	____	____	____	____	____
	____	____	____	____	____
	____	____	____	____	____
	____	____	____	____	____
	____	____	____	____	____
	____	____	____	____	____
	____	____	____	____	____

FORMATIONS ______

Spacing Application Report 3

SUBMISSION STATUS ____________ SUBMISSION ID ________ CREATION DATE ________

4. APPLICATION DETAILS

1. What is the source of production? ________

5. HOLDINGS OR UNITS

1. Does each applied-for holding have common ownership at the lessor and lessee level? ☐ Yes ☐ No

2. Are you removing the interwell distance provision for a previously approved holding? ☐ Yes ☐ No

3. Are you amending a previously approved buffer zone to reflect the regulation target area for the area of the province? ☐ Yes ☐ No

4. Are you re-aligning holding boundaries for a previously approved holding? ☐ Yes ☐ No

5. Are you changing any provisions other than those outlined in questions 2, 3, and 4? If yes, please clearly describe those changes in Section 2 of Schedule 1 in the Application Description box. ☐ Yes ☐ No

6. Enter the well density of the holding to be modified. Well density provisions cannot be increased using the modify application form. ________

7. Enter the buffer zone distance of the holding being modified. ________

7a. Enter the buffer zone orientation of the holding being modified. ________

8. Are you requesting an interwell distance for the holdings being modified. ☐ Yes ☐ No

8a. Enter the interwell distance for the modified holding. ________

6. SPECIAL DRILLING SPACING UNITS

– This section is not required –

Completing the Modify Spacing Application—Holdings or Units

Section 1: Notification Requirements

1) *Is notification required for the application as per* Directive 065?

If yes, you must continue to answers questions 2 to 6 which are the same as questions 1 to 5 described in section 7.6.2.1 in unit 7 of *Directive 065*.

If no, questions 2 to 6 are not required.

Section 5: Holding or Units

1) *Does each applied-for holding have common ownership at the lessor and lessee levels?*

Select YES if your proposed holding contains only a single DSU or whole and contiguous DSUs of common ownership (section 5.200 of the *OGCR*).

If you select NO, the application cannot be filed.

2) *Are you removing the interwell distance provision for a previously approved holding?*

If yes, notification in accordance with *Directive 065* is required. If notification was not conducted the application cannot be filed.

If no, notification may not be required.

3) *Are you amending a previously approved buffer zone to reflect the regulation target area for the province?*

If yes, notification in accordance with *Directive 065* is required. If notification was not conducted the application cannot be filed.

4) *Are you re-aligning holding boundaries for a previously approved holding?*

Select YES if you are re-aligning holding boundaries for a previously approved holding due to a change in mineral ownership.

Select NO if you are not re-aligning holding boundaries.

5) *Are you changing any provisions other than those outlined in questions 2, 3, and 4? If yes, please describe those changes in section 2 of Schedule 1 in the Application Description box.*

If YES you must clearly describe what is being changed in section 2 of Schedule 1 in the Application Description Box. If additional information beyond what is provided in the description box is necessary to describe the requested change please provide the additional information in an application attachment.

Select NO if you are not change any provisions other than those described in questions 2, 3, and 4.

6) *Enter the well density of the holding to be modified. Well density provisions cannot be increased using the modify application form.*

The well density entered on the form must match the well density in the existing approval. Well density is defined as the number of wells per pool per area. Enter the well density and then select the well density area. Possible well density areas are

- 1 legal subdivision
- 2 legal subdivisions
- 1 quarter section
- 1 half section
- 1 section
- 2 section
- 3 section
- 4 section
- per holding
- limited by buffer distance
- limited by buffer and interwell distances
- limited by interwell distance
- per pool
- see special provision

7) *Enter the buffer zone distance of the holding(s) being modified.*

Enter the requested buffer zone distance from the boundaries of each holding in metres. The buffer zone distance entered must match the existing approval or be the standard buffer zone for the area. Applications requesting non-standard buffer zones that are not currently approved for the area of application will not be accepted using the modify application form and will be closed.

The buffer zone entered must reflect the desired buffer zone for the new holding.

7a) *Enter the buffer orientation of the holdings being modified.*

Select the boundaries of the holding that the requested buffer zone distance will apply to. The selected boundaries must match the existing approval or be the standard buffer zone orientation for the area.

The buffer zone orientation entered must reflect the desired buffer zone orientation for the new holding.

8) Are you requesting an interwell distance for the holding(s) being modified?

If you select YES, enter the interwell distance in question 4a.

If No, question 4a is not required.

8a) If YES, enter the interwell distance of the holding(s) being modified.

The interwell distance entered must reflect the desired interwell distance for the new holding.

Appendix J Special Well Spacing Notification Templates

Lessees and Unleased Freehold Notification Letter

Leased Individual Freehold Notification Letter

Notification letters are not to be submitted with the application unless requested by the AER.

Lessees and Unleased Freehold Notification Letter

[Date]

Dear [Sir/Madam]:

[APPLICANT NAME]
[SPECIAL [GAS/OIL] WELL SPACING]
[FIELD(s)]
[FORMATION(s)/POOL(s)]
[DLS LAND DESCRIPTION]

[Applicant/Consultant on behalf of Applicant] will be applying to the Alberta Energy Regulator (AER) under [section] of the *Oil and Gas Conservation Act* [and/or] [section] of the *Oil and Gas Conservation Rules* to change the subsurface well spacing for the production of [gas/oil] from the [formation(s)/pool(s)] in the noted lands [list lands in the above title and/or provide attachment/ map]. AER *Directive 065: Resources Applications for Oil and Gas Reservoirs* requires that all mineral owners within the applied-for formation in the area of application and one (1) drilling spacing unit (DSU) surrounding the area of application receive notification of a well spacing application.

[Applicant/Consultant on behalf of Applicant] proposes that within the area of application, the existing [gas/oil] well spacing be changed from [the current spacing in place] to the following:

Example 1: Holding

Establish a holding constituting [DLS land description] for the production of [gas/oil] from the [applied-for formation(s)/pool(s)] subject to:

A producing well will be at least [X] metres from the boundaries of the holding.

There will be a maximum of [X] producing wells per pool per [DSU size].

A producing well will be at least [X] metres from other wells producing from the same pool. (Only applicable if requesting an interwell distance.)

The following well UWIs [XX/XX-XX-XXX-XX-WX] will be exempt from the [buffer zone and/ or interwell distance].

Example 2: Rescind Special DSU(s)

Re-establish standard drilling spacing units in accordance with Part 4 of the *OGCR* of [DSU size] [and if applicable orientation], with the target area being [target area(s)] for the production of [oil/ gas] in the [applied-for formation(s)/pool(s)] in [DLS land description].

[Brief Discussion of Reason for Application]

Any concerns and/or questions regarding this application are to be directed to [applicant contact person and phone number]. You may also send your concerns in writing to [applicant's address] or by fax or e-mail within 15 working days from the date of this letter. [Applicant] will contact you to discuss your concerns. Should your concerns remain unresolved, they will be included as a submission to the application when filed with the AER.

Under section 13 of the *Alberta Energy Regulator Rules of Practice*, all documents filed with the AER in connection to an application must be placed on the public record, which may be accessible on the Internet. As such, you should not include any confidential or sensitive personal information (e.g., health issues, financial position, family issues) in documents submitted to us or the AER that you do not want to appear on the public record. However, any party may, before filing the document, submit a request to the AER for confidentiality of documents under section 13(2). The AER may grant a request for confidentiality on any terms it considers appropriate, subject to the *Freedom of Information and Protection of Privacy Act*.

In the absence of a response on or before [date—at least 15 working days from the mailing date of this letter], we will proceed to file the application with the AER.

After the application has been registered with the AER, copies can be obtained by contacting the undersigned or can be viewed electronically by accessing the IAR Query under Systems & Tools on the AER website at www.aer.ca.

Any questions regarding the AER process should be directed to the AER Customer Contact Centre at 403-297-8311 or 1-855-297-8311 (toll free).

Yours truly,

[Applicant]

Leased Individual Freehold Notification Letter

[Date]

Dear [Sir/Madam]:

[APPLICANT NAME]
[SPECIAL [GAS/OIL] WELL SPACING]
[FIELD (s)]
[FORMATION(s)/POOL(s)]
[DLS LAND DESCRIPTION]

[Applicant/Consultant on behalf of Applicant] will be applying to the Alberta Energy Regulator (AER) under [section] of the *Oil and Gas Conservation Act* [and/or] [section] of the *Oil and Gas Conservation Rules* to change the subsurface well spacing for the production of [gas/oil] from the [formation(s)/pool(s)] in the noted lands [list lands in the above title and/or provide attachment/ map].

Records indicate that you are a Freehold mineral owner in [DLS land description] and your minerals are leased to [Company]. AER *Directive 065: Resources Applications for Oil and Gas Reservoirs* requires that all Freehold mineral owners within the applied-for formation(s) in the area of application and one (1) drilling spacing unit (DSU) surrounding the area of application whose rights are leased receive notification of the subject application. The purpose of this notification is to provide you with information regarding potential development and to support ongoing dialogue between you and the lessee of your minerals.

[Applicant/Consultant on behalf of Applicant] proposes that within the area of application the existing [gas/oil] well spacing be changed from [the current spacing in place] to the following:

Example 1: Holding

Establish a holding constituting [DLS land description] for the production of [gas/oil] from the [applied-for formation(s)/pool(s)] subject to:

A producing well will be at least [X] metres from the boundaries of the holding.

There will be a maximum of [X] producing wells per pool per [DSU size].

A producing well will be at least [X] metres from other wells producing from the same pool. (Only applicable if requesting an interwell distance.)

The following well UWIs [XX/XX-XX-XXX-XX-WX] will be exempt from the [buffer zone and/ or interwell distance].

Example 2: Rescind Special DSU(s)

Re-establish standard drilling spacing units in accordance with Part 4 of the *OGCR* of [DSU size] [and if applicable orientation], with the target area being [target area(s)] for the production of [oil/ gas] in the [applied-for formation(s)/pool(s)] in [DLS land description].

[Brief Discussion of Reason for Application]

The lessee of your minerals has also been notified of this application. Therefore, if you have any questions regarding the effect of this application on your interests, please contact your lessee. If discussions between you and your lessee do not address your concerns, please clearly state your concerns in writing to the undersigned at [applicant's address] or by fax or e-mail within 15 business days from the date of this letter. Your concerns will be included as a submission to the application when filed with the AER.

OR

As [Company] is the lessee of your offsetting minerals in [DLS land description], should you have questions regarding the effect of this application on your minerals, please contact [applicant contact person and phone number]; you may also send your concerns in writing to [applicant's address] or by fax or e-mail within 15 business days from the date of this letter. If discussions do not address your concerns, they will then be included as a submission to the application when filed with the AER.

Under section 13 of the *Alberta Energy Regulator Rules of Practice*, all documents filed with the AER in connection to an application must be placed on the public record, which may be accessible on the Internet. As such, you should not include any confidential or sensitive personal information (e.g., health issues, financial position, family issues) in documents submitted to us or the AER that you do not want to appear on the public record. However, any party may, before filing the document, submit a request to the AER for confidentiality of documents under section 13(2). The AER may grant a request for confidentiality on any terms it considers appropriate, subject to the *Freedom of Information and Protection of Privacy Act*.

After the application has been registered with the AER, copies can be obtained by contacting the undersigned or can be viewed electronically by accessing the IAR Query under Systems & Tools on the AER website at www.aer.ca.

Any questions regarding the AER process should be directed to the AER Customer Contact Centre at 403-297-8311 or 1-855-297-8311 (toll free).

Yours truly,

[Applicant]

Appendix K Special Well Spacing Attachment Examples

Lessor Map and Notification Area

Lessee Map and Notification Area

Mineral Rights Ownership and Notification List

Attachments described in appendix K are not to be submitted with the application unless requested by the AER.

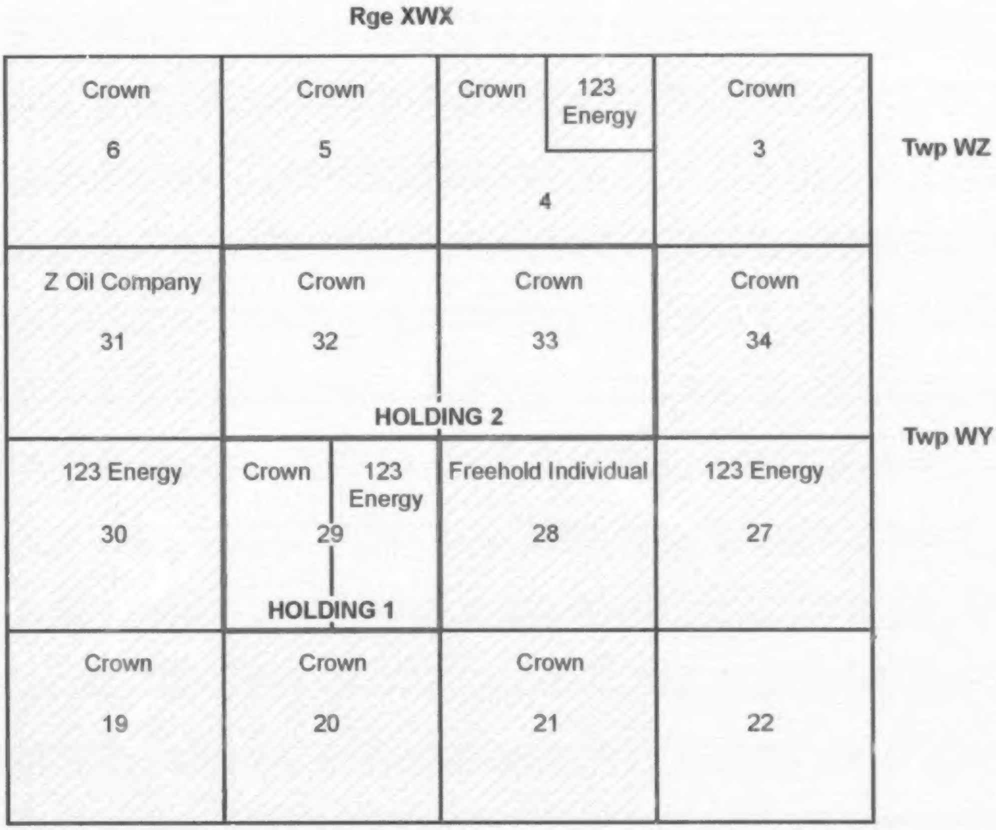
Lessor Map and Notification Area

Show only the lessors for the substance and formation(s)/pool(s) being applied for within the application area and one DSU around the application area. The application area must be clearly outlined on the map and the information must be accurate and shown on a map of sufficient scale to facilitate a quick review of the mineral ownership.

For areas with complex ownership, a map coded to a list of mineral owners may be used. Do not send title search documents.

In this map, the notification area includes Holding 1, Holding 2, and 1 DSU around the application area.

Example: Lessor Map for NG in the Rock Creek Formation


Rge XWX
Twp WZ
Twp WY
Crown 6
Crown 5
Crown 4
123 Energy
Crown 3
Z Oil Company 31
Crown 32
Crown 33
Crown 34
HOLDING 2
123 Energy 30
Crown 29
123 Energy
Freehold Individual 28
123 Energy 27
HOLDING 1
Crown 19
Crown 20
Crown 21
22

ABC Oil & Gas Ltd., Lessor Map ☐ DSU

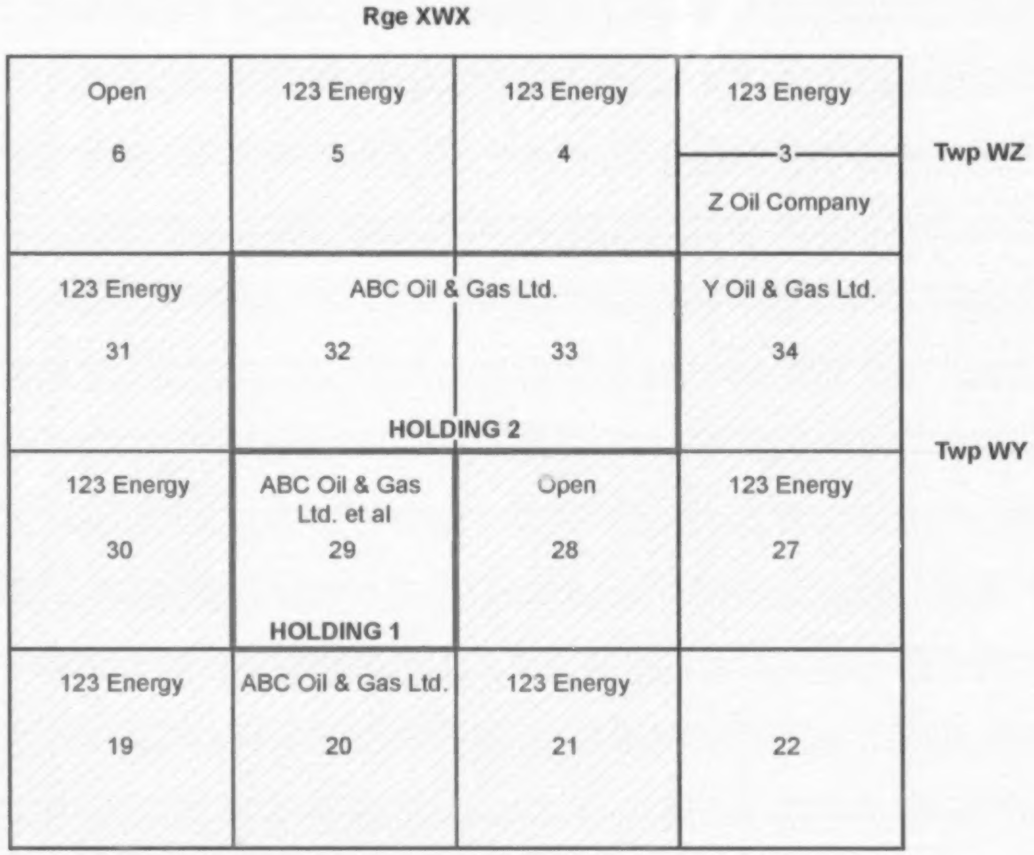
Lessee Map and Notification Area

Show only the lessees for the substance and formation(s)/pool(s) being applied for within the application area and one DSU around the application area. The application area must be clearly outlined on the map and the information must be accurate and shown on a map of sufficient scale to facilitate a quick review of the mineral ownership.

For areas with complex ownership, a map coded to a list of mineral owners may be used. Do not send title search documents.

In this map the notification areas are Holding 1, Holding 2, and 1 DSU around the application area.

Example: Lessee Map for NG in the Rock Creek Formation


Rge XWX
Open
6
123 Energy
5
123 Energy
4
123 Energy
3
Z Oil Company
Twp WZ
123 Energy
31
ABC Oil & Gas Ltd.
32
33
Y Oil & Gas Ltd.
34
HOLDING 2
Twp WY
123 Energy
30
ABC Oil & Gas Ltd. et al
29
HOLDING 1
Open
28
123 Energy
27
123 Energy
19
ABC Oil & Gas Ltd.
20
123 Energy
21
22

ABC Oil & Gas Ltd., Lessee Map ☐ DSU

Mineral Rights Ownership and Notification List

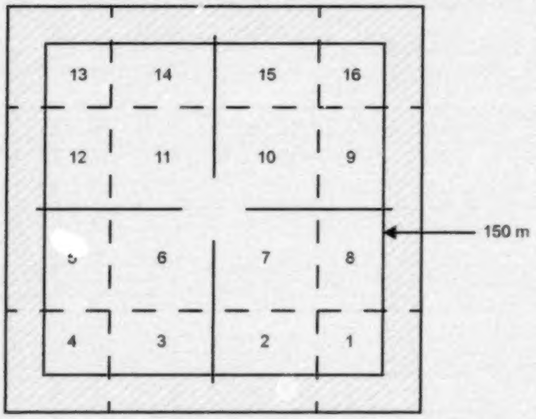
List all mineral rights owners who have oil, gas, and coal rights in the applied-for formation(s)/pool(s) and were notified of your application. The list must include the legal land description of each mineral owner, their working interest, and a description of their mineral right(s). (Addresses of mineral owners are not required.) This list is in addition to the lessor and lessee maps.

Mineral Rights Ownership and Notification List (Example for Rock Creek Formation)

AREA OF APPLICATION				
Location	Lessor	Lessee	Working Interest	Mineral Right(s)
HOLDING 1				
TwpWY-RgeX WX: Sec 29 E½	123 Energy	ABC Oil & Gas Ltd.	50%	P&NG surface to basement
		Z Oil Company	50%	P&NG surface to basement
TwpWY-RgeX WX: Sec 29 W½	Crown	ABC Oil & Gas Ltd.	50%	P&NG surface to basement
		Z Oil Company	50%	P&NG surface to basement
HOLDING 2				
TwpWY-RgeX WX: Sec 32	Crown	ABC Oil & Gas Ltd.	100%	P&NG surface to base Rock Creek
TwpWY-RgeX WX: Sec 33	Crown	ABC Oil & Gas Ltd.	100%	P&NG surface to base Rock Creek
1 DSU SURROUNDING AREA OF APPLICATION				
Location	Lessor	Lessee	Mineral Right(s)	
Twp WY-RgeX WX: Sec 19	Crown	123 Energy	P&NG surface to basement	
Twp WY-RgeX WX: Sec 20	Crown	ABC Oil & GasLtd.	P&NG Rock Creek formation	
Twp WY-RgeX WX: Sec 21	Crown	123 Energy	P&NG surface to basement	
Twp WY-RgeX WX: Sec 27	123 Energy	123 Energy	P&NG surface to basement	
Twp WY-RgeX WX: Sec 28	Freehold Individual	Open	P&NG Rock Creek formation	
Twp WY-RgeX WX: Sec 30	123 Energy	123 Energy	P&NG surface to basement	
Twp WY-RgeX WX: Sec 31	Z Oil Company	123 Energy	P&NG surface to basement	
Twp WY-RgeX WX: Sec 34	Crown	Y Oil & Gas Ltd.	NG Rock Creek formation	
Twp WY-RgeX WX: Sec 34	Crown	XYZ Oil	Petroleum Rock Creek formation	
Twp WZ-RgeX WX: Sec 3 N½	Crown	123 Energy	P&NG surface to basement	
Twp WZ-RgeX WX: Sec 3 S½	Crown	Z Oil Company	P&NG surface to base Nordegg	
Twp WZ-RgeX WX: Sec 4 S½, NW 1/4	Crown	123 Energy	P&NG surface to basement	
Twp WZ-RgeX WX: Sec 4 NE 1/4	123 Energy	123 Energy	P&NG surface to basement	
Twp WZ-RgeX WX: Sec 5	Crown	123 Energy	P&NG surface to basement	
Twp WZ-RgeX WX: Sec 6	Crown	Open	Coal surface to basement	
Twp WZ-RgeX WX: Sec 6	Crown	Open	P&NG surface to basement	

Appendix L Standard Target Areas and Buffer Zones

For Gas Production – Outside Schedule 13A Area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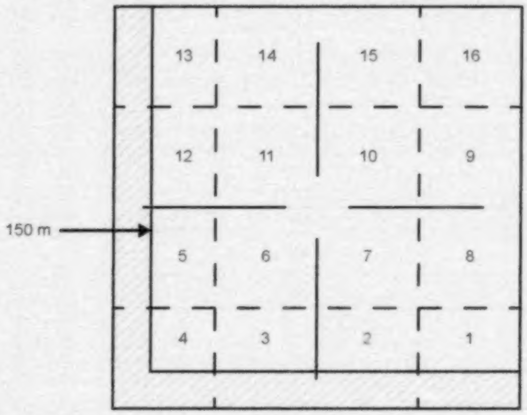
6
7
8
4
3
2
1
150 m

Standard gas DSU with target area 150 m from all boundaries

For Gas Production – Within Schedule 13A Area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14
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16
12
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150 m
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6
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8
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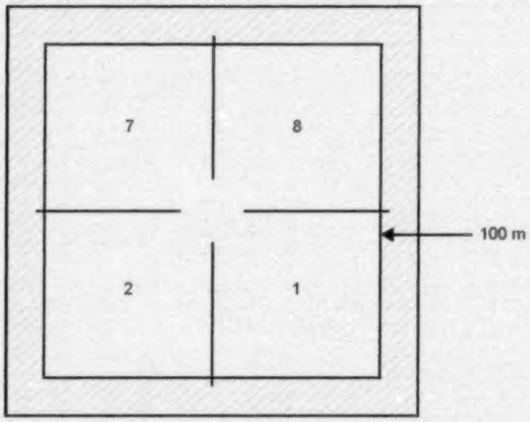
3
2
1

Standard gas DSU with target area 150 m from south and west boundaries

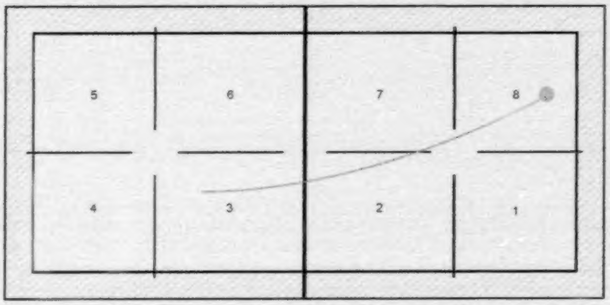
For Oil Production – All Alberta



Standard oil DSU with target area 100 m from all boundaries

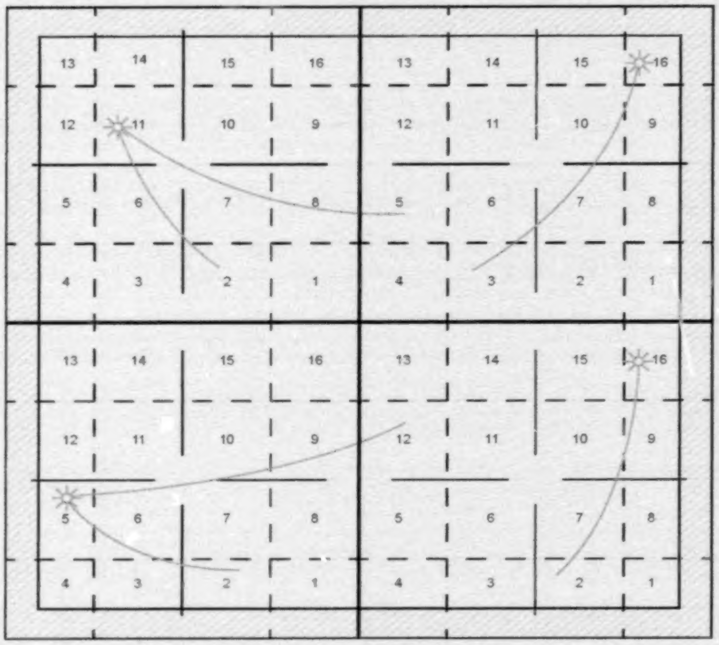
Examples of Development on Multiple Contiguous DSUs of Common Ownership

Example of a horizontal oil well drilled across two adjacent quarter-section DSUs of common mineral ownership.



1/4 section oil DSUs: Target area – all boundaries 100 m

Example of horizontal gas wells drilled in a four-section contiguous block having common mineral ownership outside the Schedule 13A area.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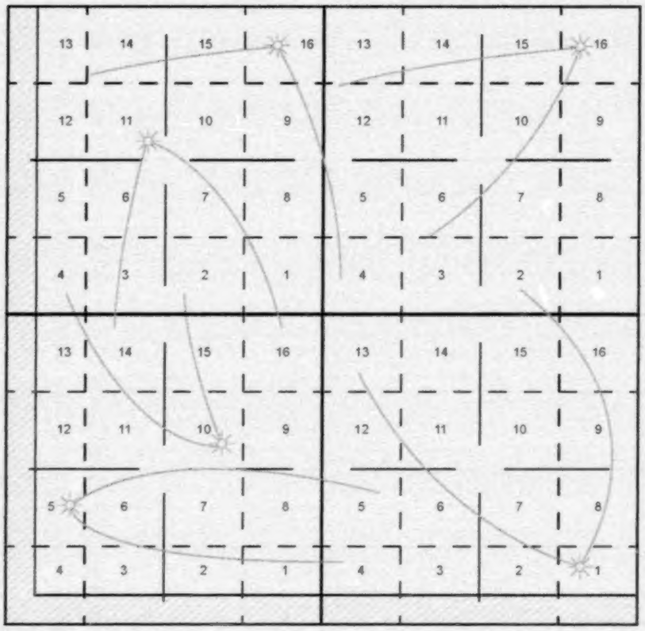
8
5
6
7
8
4
3
2
1
4
3
2
1

1 section gas DSUs: Target area – all boundaries 150 m

Example of horizontal gas wells drilled in a four-section contiguous block having common mineral ownership within the Schedule 13A area for zones that have no well density restrictions.



1 section gas DSUs: Target area – south and west boundaries 150 m

Appendix M Target Area Descriptions for Special Well Spacing Before October 6, 2011

DSU size	Target area *OGCR* section	Target area description
One section	Central area 4.030(1)(a)	Central part of the section having sides 300 m from the boundaries of the section and parallel to them
	Central area 4.030(2)(a)	Central part of the section having sides 300 m from the boundaries of the section and parallel to them
One half section	Southwest or northeast quarter section 4.030(1)(b)	Central part of the southwest or northeast quarter section having sides 200 m from the boundaries of the quarter section and parallel to them
	LSD 6 or 16 4.030(2)(b)	Consists of LSD 6 or 16
One quarter section	Central area 4.030(1)(b)	Central part of the quarter section having sides 200 m from the boundaries of the quarter section and parallel to them
	LSD 6, 8, 14, or 16 4.030(2)(c)	Consists of LSD 6, 8, 14, or 16
	Southwest LSD 4.030(1)(c)	Central part of the southwest legal subdivision of the quarter section having sides 100 m from the boundaries of the legal subdivision and parallel to them
Two legal subdivisions	Southwest or northeast LSD 4.030(1)(c)	Central part of the southwest or northeast legal subdivision of the quarter section having sides 100 m from the boundaries of the legal subdivision and parallel to them
	Northwest quarter of the southwest or northeast LSD 4.030(2)(d)	The northwest quarter of the southwest or northeast legal subdivision of the quarter section
One legal subdivision	Central area 4.030(1)(c)	Central part of the legal subdivision having sides 100 m from the boundaries of the legal subdivision and parallel to them
	Northwest quarter of the LSD 4.030(2)(e)	Consists of the northwest quarter of the legal subdivision

Appendix N

Special Well Spacing Declaration Templates

Declaration of Common Ownership

Declaration of Notification

DECLARATION OF COMMON OWNERSHIP

______________________________, as applicant, hereby declares that the mineral
(company name)

owner(s) of the lessor's interests and the mineral owner(s) of the lessee's interests throughout each applied-for holding are common or considered to be common in accordance with *Directive 065: Resources Applications for Oil and Gas Reservoirs.*

Dated at ______________, __________________ on __________________.
(city) *(province)*

Signature: ______________________
Authorized Representative

____
(print name)

____
(company name)

DECLARATION OF NOTIFICATION

______________________________, as applicant, hereby declares that notification of
(company name)

the application has been conducted in accordance with *Directive 065: Resources Applications for Oil and Gas Reservoirs*, with all applicable mineral owners having been notified using the appropriate notification template(s).

Dated at _______________, __________________on ______________________.
(city) *(province)*

Signature: ______________________
Authorized Representative

____
(print name)

____
(company name)

Appendix O Step-Rate Injectivity Test

The most common method of testing a zone to determine the maximum wellhead injection pressure is a step-rate injectivity test. The following standard procedure for carrying out a step-rate injectivity test is recommended:[1]

1) Before commencing the test, ensure that the well has been shut in long enough for the bottomhole pressure to be reasonably close to the formation pressure. If the well is on injection, reduce the rate to a level that allows the bottomhole pressure to stabilize. Injection should continue long enough to achieve a stabilized pressure.
2) The first injection period must be long enough to clearly overcome wellbore storage and achieve radial flow conditions. A stabilized pressure will indicate that radial flow conditions have been achieved. The value recorded at this stabilized pressure will be the first point on the plot. The time required to achieve this stabilized pressure must then be applied to all subsequent injection periods.
3) Apply five successively higher injection rates, each of the same duration as the first injection period. Record the injection rate, pressure, and elapsed time for each rate step. A minimum of five steps are required to clearly identify the absence or presence of an inflection point that indicates a fracture in the formation. At least two injection rate pressure combinations greater than the fracture pressure are necessary to confirm that the formation fracture pressure has been exceeded.
4) Plot the stabilized pressures and injection rates graphically. Draw a straight line with a constant slope through each stabilized pressure. The point of inflection should indicate the formation fracture pressure.

Include any continuous pressure and injection data, if recorded, when submitting the step-rate test data and analysis.

Note that step-rate test data conducted after a hydraulic fracture stimulation may be inconclusive, and may not be acceptable for determining fracture pressure.

Default Maximum Wellhead Injection Pressure

In the absence of step-rate injectivity test data or analogous test data, maximum wellhead injection pressure (MWHIP) will be set in accordance with the following table. These wellhead pressures are based on a statistical analysis of province-wide fracture data. The fracture pressure used to calculate the wellhead pressures is conservative and based on a confidence level at the 90th percentile that injection at this pressure will not fracture the formation.

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[1] Singh, P.K., Agarwal, R.G., and Jrase, L.D. "Systematic design and analysis of step-rate tests to determine formation parting pressure." SPE paper 16798 presented at the 62nd Annual Technical Conference and Exhibition of the Society of Petroleum Engineers, Dallas, Texas, September 1987.

Table 1. Maximum allowable wellhead injection pressure

Depth interval (m)	Wellhead pressure (kPag*)	Depth interval (m)	Wellhead pressure (kPag)
401–450	3000	1451–1500	4400
451–500	3200	1501–1550	4450
501–550	3300	1551–1600	4500
551–600	3450	1601–1650	4550
601–650	3550	1651–1700	4600
651–700	3600	1701–1750	4650
701–750	3650	1751–1800	4700
751–800	3700	1801–1850	4800
801–850	3750	1851–1900	5200
851–900	3800	1901–1950	5650
901–950	3850	1951–2000	6000
951–1000	3900	2001–2050	6400
1001–1050	3950	2051–2100	6750
1051–1100	4000	2101–2150	7150
1101–1150	4050	2151–2200	7550
1151–1200	4100	2201–2250	7950
1201–1250	4150	2251–2300	8350
1251–1300	4200	2301–2350	8750
1301–1350	4250	2351–2400	9150
1351–1400	4300	2401–2450	9500
1401–1450	4350	2450–2500	9900

* kPag = kilopascals (gauge).

If the depth interval is shallower than 400 m, calculate the MWHIP as follows:

Wellhead pressure = 7.5 × depth

where

wellhead pressure = pressure at the wellhead in kPag

depth = top of injection or disposal interval in metres total vertical depth (m TVD)

In cases where the depth interval is deeper than 2500 m, calculate the MWHIP as follows:

Wellhead pressure = 4.0 × depth

where

wellhead pressure = pressure at the wellhead in kPag

depth = top of injection or disposal interval in m TVD

Wellhead pressures in this table assume that fluids being injected or disposed have a pressure gradient of gradient of 10.52 kPag per metre (kPag/m). Any loss in pressure as a result of friction was not considered when estimating the wellhead pressures in the table. For fluids of a different gradient, the wellhead pressure can be revised as follows:

$$(\text{MWHIP})_{\text{revised}} = (\text{MWHIP})_{\text{table}} + [(10.52 - \text{gradient}) \times \text{depth}]$$

where

$\text{MWHIP}_{\text{revised}}$ = estimate based on a fluid gradient other than 10.52 kPag/m

$\text{MWHIP}_{\text{table}}$ = estimate based on a fluid gradient of 10.52 kPag/m

gradient = actual fluid gradient in kPag/m

depth = top of injection or disposal interval in m TVD